MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R Ethernet User's Manual (Application)

-RJ71EN71
-R04CPU
-R08CPU
-R08PCPU
-R16CPU
-R16PCPU
-R32CPU
-R32PCPU
-R120CPU
-R120PCPU

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the MELSEC iQ-R Module Configuration Manual.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠ **WARNING**	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ **CAUTION**	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.
  (2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
    - Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
    - Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
  (3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.
  (4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
- For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.

[Design Precautions]

⚠WARNING

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.
- To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.

[Design Precautions]

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
- Do not power off the programmable controller or reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so also may cause malfunction or failure of the module.
- When changing the operating status of the CPU module from external devices (such as the remote RUN/STOP functions), select "Do Not OPEN in Program" for "Open Method Setting" in the module parameters. If "OPEN in Program" is selected, an execution of the remote STOP function causes the communication line to close. Consequently, the CPU module cannot reopen the line, and external devices cannot execute the remote RUN function.

[Installation Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines included with the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
- When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Securely insert an extended SRAM cassette into the cassette connector of the CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, or connector. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact. Do not clamp the extension cables with the jacket stripped.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury and fire.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module, and do not insert/remove the extended SRAM cassette to/from the CPU module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction.
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette. Doing so may cause malfunction or failure of the module.

[Startup and Maintenance Precautions]

⚠CAUTION

- Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Operating Precautions]

⚠CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so can cause malfunction or failure of the module.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

⚠CAUTION

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

CONDITIONS OF USE FOR THE PRODUCT

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC iQ-R series programmable controllers.
This manual describes the functions, programming, and troubleshooting of the relevant products listed below.
Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.
When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.
Please make sure that the end users read this manual.

Relevant products

RJ71EN71, CPU module

Point

Unless otherwise specified, the buffer memory addresses in this manual are for when the P1 connecter of the RJ71EN71 is used.
Check the corresponding buffer memory addresses in the list and use the correct addresses when using the following: (☞ Page 191 Buffer Memory)
- CPU module
- P2 connector of the RJ71EN71
- RJ71EN71 (network type: Q-compatible Ethernet)

MEMO

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Ethernet User's Manual (Application) [SH-081257ENG] (this manual)	Functions, parameter settings, programming, troubleshooting, I/O signals, and buffer memory of Ethernet	Print book
		e-Manual EPUB PDF
MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup) [SH-081256ENG]	Specifications, procedures before operation, system configuration, wiring, and communication examples of Ethernet, CC-Link IE Controller Network, and CC-Link IE Field Network	Print book
		e-Manual EPUB PDF
MELSEC iQ-R CPU Module User's Manual (Startup) [SH-081263ENG]	Performance specifications, procedures before operation, and troubleshooting of the CPU module	Print book
		e-Manual EPUB PDF
MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks) [SH-081266ENG]	Instructions for the CPU module, link dedicated instructions, socket communications/fixed buffer communications instructions	e-Manual EPUB PDF
SLMP Reference Manual [SH-080956ENG]	The protocol (SLMP) used for data reading or writing from an external device to the Ethernet-equipped module	Print book
		e-Manual EPUB PDF

This manual does not include information on the module function blocks.
For details, refer to the Function Block Reference for the module used.

Point

e-Manual refers to the Mitsubishi FA electronic book manuals that can be browsed using a dedicated tool.
e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
ARP	The abbreviation for Address Resolution Protocol. This protocol is used to obtain the MAC address of Ethernet from an IP address.
Buffer memory	A memory in an intelligent function module, where data (such as setting values and monitoring values) are stored. When using the CPU module, the memory is indicated for storing data (such as setting values and monitored values) of the Ethernet function and data used for data communication of the multiple CPU function.
BUFRCV	A generic term for the GP.BUFRCV and ZP.BUFRCV
BUFRCVS	A generic term for the G.BUFRCVS and Z.BUFRCVS
BUFSND	A generic term for the GP.BUFSND and ZP.BUFSND
CLOSE	A generic term for the GP.CLOSE and ZP.CLOSE
Control CPU	A CPU module that controls connected I/O modules and intelligent function modules. In a multiple CPU system, there are multiple CPU modules and each connected module can be controlled by a different CPU module.
CPU module	A generic term for the MELSEC iQ-R series CPU module
Dedicated instruction	An instruction for using functions of the module
Device	A device (X, Y, M, D, or others) in a CPU module
Engineering tool	Another term for the software package for the MELSEC programmable controllers
ERRCLEAR	A generic term for the GP.ERRCLEAR and ZP.ERRCLEAR
ERRRD	A generic term for the GP.ERRRD and ZP.ERRRD
Ethernet device	A generic term for the devices supporting IP communication (such as personal computers)
Ethernet-equipped module	A generic term for the RJ71EN71 (when the Ethernet function is used) and MELSEC iQ-R series CPU module (when the Ethernet function is used)
External device	A generic term for personal computers connected with Ethernet for data communication and other Ethernet-equipped modules
FTP	The abbreviation for File Transfer Protocol. This protocol is used to transfer data files over a network.
Global label	A label that is enabled for all program data when creating multiple program data in the project. There are two types of global labels: module label that is automatically generated by GX Works3 and label that can be created for the any of the specified devices.
ICMP	The abbreviation for Internet Control Message Protocol. This protocol is used to exchange messages of errors in an IP network or other information related to an Ethernet network.
Intelligent function module	A module that has functions other than input and output, such as an A/D converter module and D/A converter module
Label	A label that represents a device in a given character string
MELSECNET/10	The abbreviation for the MELSECNET/10 network system
MELSECNET/H	The abbreviation for the MELSECNET/H network system
Module label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. GX Works3 automatically generates this label, which can be used as a global label.
Network module	A generic term for the following modules: • Ethernet interface module • CC-Link IE Controller Network module • Module on CC-Link IE Field Network • MELSECNET/H module • MELSECNET/10 module
OPEN	A generic term for the GP.OPEN and ZP.OPEN
Predefined protocol support function	A function of GX Works3. This function sets protocols appropriate to each external device and reads/writes protocol setting data.
READ	A generic term for the JP.READ and GP.READ
RECV	A generic term for the JP.RECV and GP.RECV
RECVS	A generic term for the G.RECVS and Z.RECVS
Relay station	A station that includes two or more network modules. Transient transmission is performed through this station to stations on other networks
REQ	A generic term for the J.REQ, JP.REQ, G.REQ, and GP.REQ

Term	Description
Routing	A process of selecting paths for communication with other networks. There are two types of routing: dynamic routing that auto-selects the communication routes, and static routing where communication routes are arbitrarily set.
Seamless communication	Communication that allows users to access a different kind of networks without having to consider the differences as if data were exchanged within one single network
SEND	A generic term for the JP.SEND and GP.SEND
SLMP	The abbreviation for SeamLess Message Protocol. This protocol is used to access an SLMP-compatible device or a programmable controller connected to an SLMP-compatible device from an external device.
SREAD	A generic term for the JP.SREAD and GP.SREAD
Subnet mask	A number used to logically divide one network into multiple subnetworks and manage them easily. The following Ethernet network systems can be configured: • A small-scale Ethernet network system in which multiple network devices are connected • A medium- or large-scale network system in which multiple small-scale network systems are connected via routers or other network communication devices
SWRITE	A generic term for the JP.SWRITE and GP.SWRITE
Transient transmission group number	Number that is assigned for transient transmission to any given stations. By specifying a group of stations as transient transmission target, data can be sent to the stations of the same group number.
UINI	A generic term for the G.UINI, GP.UINI, Z.UINI, and ZP.UINI
WRITE	A generic term for the JP.WRITE and GP.WRITE
ZNRD	A generic term for the J.ZNRD and JP.ZNRD
ZNWR	A generic term for the J.ZNWR and JP.ZNWR

1 FUNCTIONS

1.1 Connection with MELSOFT Product and GOT

Programming and monitoring of the programmable controller with the engineering tool, and monitoring and testing of the programmable controller from the GOT can be performed via Ethernet. This function enables remote operations using Ethernet's long-distance connection and high-speed communication.

The section describes the methods of connecting the Ethernet-equipped module, MELSOFT product (such as engineering tool and MX Component), and GOT.

○: Connection available, ×: Connection not available

Connection method	Purpose	Availability			
		MELSOFT products		GOT	
		RJ71EN71	CPU module	RJ71EN71	CPU module
Connection via a hub (Connection by specifying the IP address)	• To connect to an Ethernet-equipped module that has no network number and station number • To connect multiple MELSOFT products	○	○	×	○
Connection via a hub (Connection by specifying the network number and station number)	• To connect by using network number and station number • To connect multiple MELSOFT products and GOTs	○	×	○	×
Direct connection (Connection without specifying the IP address, network number, or station number)*1	• To connect without hub using one Ethernet cable for one-on-one communication with the external device • To connect to an Ethernet-equipped module whose IP address in unknown	○	○	×	×

*1 This connection method is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".

Point

For the procedures to connect the Ethernet-equipped module and GOT, refer to the following.

Manual for the GOT used

Connection via a hub

Setting procedure

■Setting in the Ethernet-equipped module side

Set the IP address of the Ethernet-equipped module in "Own Node Settings" under "Basic Settings". (☞ Page 125 Own Node Settings)

When connecting by specifying the network number and station number, set the network number and station number in "Own Node Settings" under "Basic Settings".

Even if "External Device Configuration" is not set under "Basic Settings", the Ethernet-equipped module can be connected to the MELSOFT product and GOT using the system dedicated connection. *1

*1 When using a TCP/IP connection with the system dedicated connection, up to ((maximum number of connected modules in "External Device Configuration") - (set number) + 1) modules can be connected.
When using a UDP/IP connection, up to the maximum number of connectable modules can be connected.

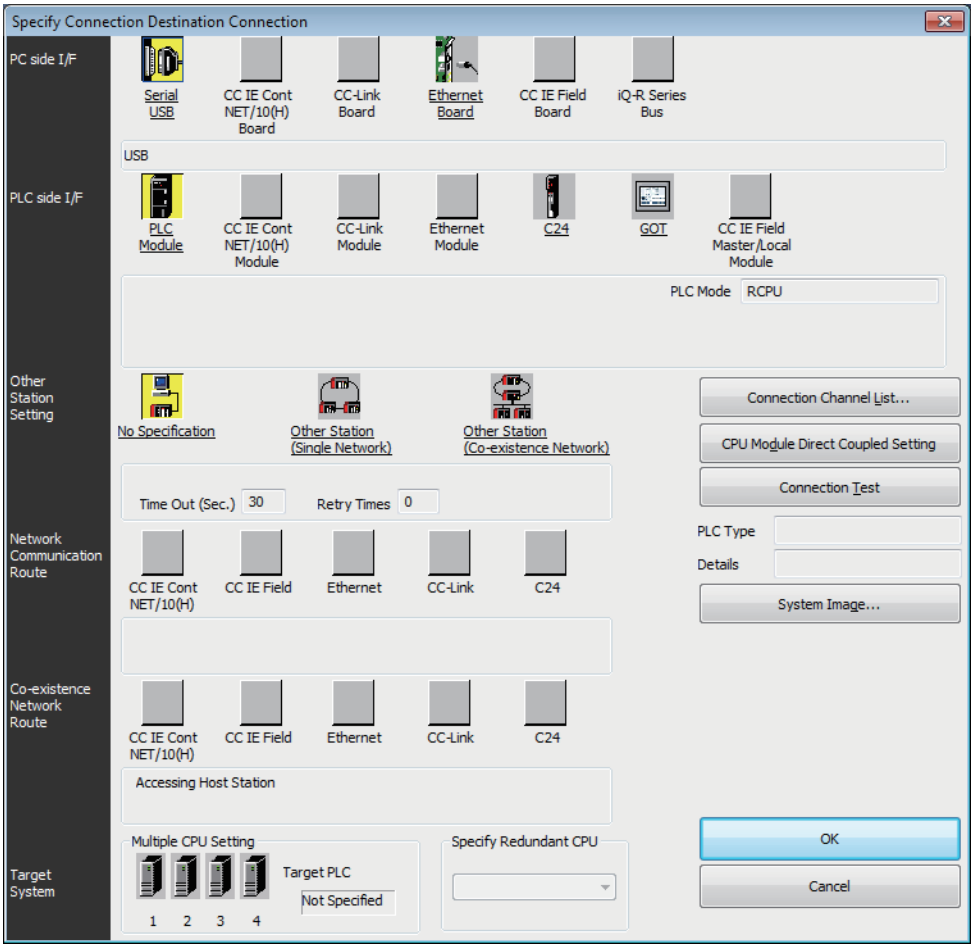
Point

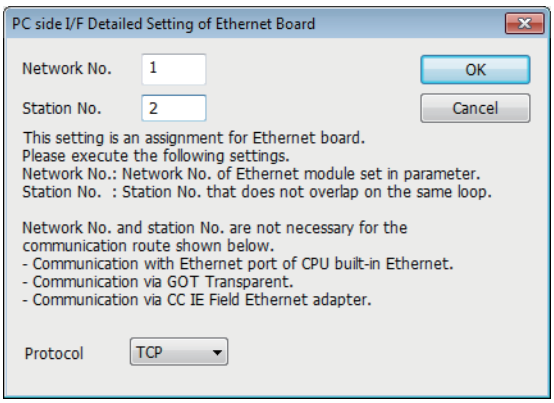
When connecting multiple MELSOFT products with TCP/IP, drag "MELSOFT Connection Module" from the "Module List" to "List of devices" or "Device map area" in "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

■Settings on the engineering tool side

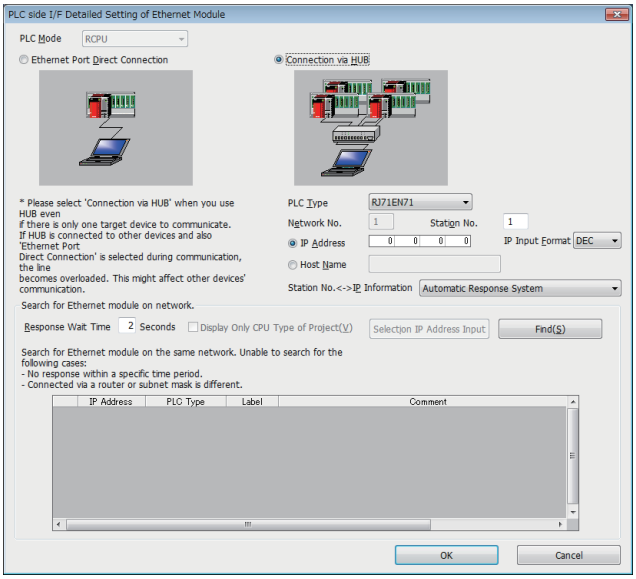
Set with "Specify Connection Destination".

[Online] ⇨ [Specify Connection Destination]




PC side I/F Detailed Setting of Ethernet Board
Network No.
1
Station No.
2
OK
Cancel
This setting is an assignment for Ethernet board.
Please execute the following settings.
Network No.: Network No. of Ethernet module set in parameter.
Station No. : Station No. that does not overlap on the same loop.
Network No. and station No. are not necessary for the communication route shown below.
- Communication with Ethernet port of CPU built-in Ethernet.
- Communication via GOT Transparent.
- Communication via CC IE Field Ethernet adapter.
Protocol
TCP

1. Set "PC side I/F" to "Ethernet Board".
2. Double-click "Ethernet Board", and open the "PC side I/F Detailed Setting of Ethernet board" window.
3. Set the network number, station number, and protocol of the personal computer. (Set the network number and protocol according to the settings for the Ethernet-equipped module. Set the station number so that it is not the same as a station number assigned to other Ethernet devices.)*1
4. Set the "PLC side I/F" to the module to be connected.


PLC side I/F Detailed Setting of Ethernet Module
PLC Mode
RCPU
Ethernet Port Direct Connection
Connection via HUB
* Please select 'Connection via HUB' when you use HUB even
if there is only one target device to communicate.
If HUB is connected to other devices and also 'Ethernet Port
Direct Connection' is selected during communication, the line
becomes overloaded. This might affect other devices' communication.
PLC Type
RJ71EN71
Network No.
Station No.
IP Address
IP Input Format
DEC
Host Name
Station No.<->IP Information
Automatic Response System
Search for Ethernet module on network.
Response Wait Time
Seconds
Display Only CPU Type of Project(V)
Selection IP Address Input
Find(S)
Search for Ethernet module on the same network. Unable to search for the following cases:
- No response within a specific time period.
- Connected via a router or subnet mask is different.
IP Address
PLC Type
Label
Comment
OK
Cancel

5. Double-click the icon set in step 4, and open the "PLC side I/F Detailed Setting" window.

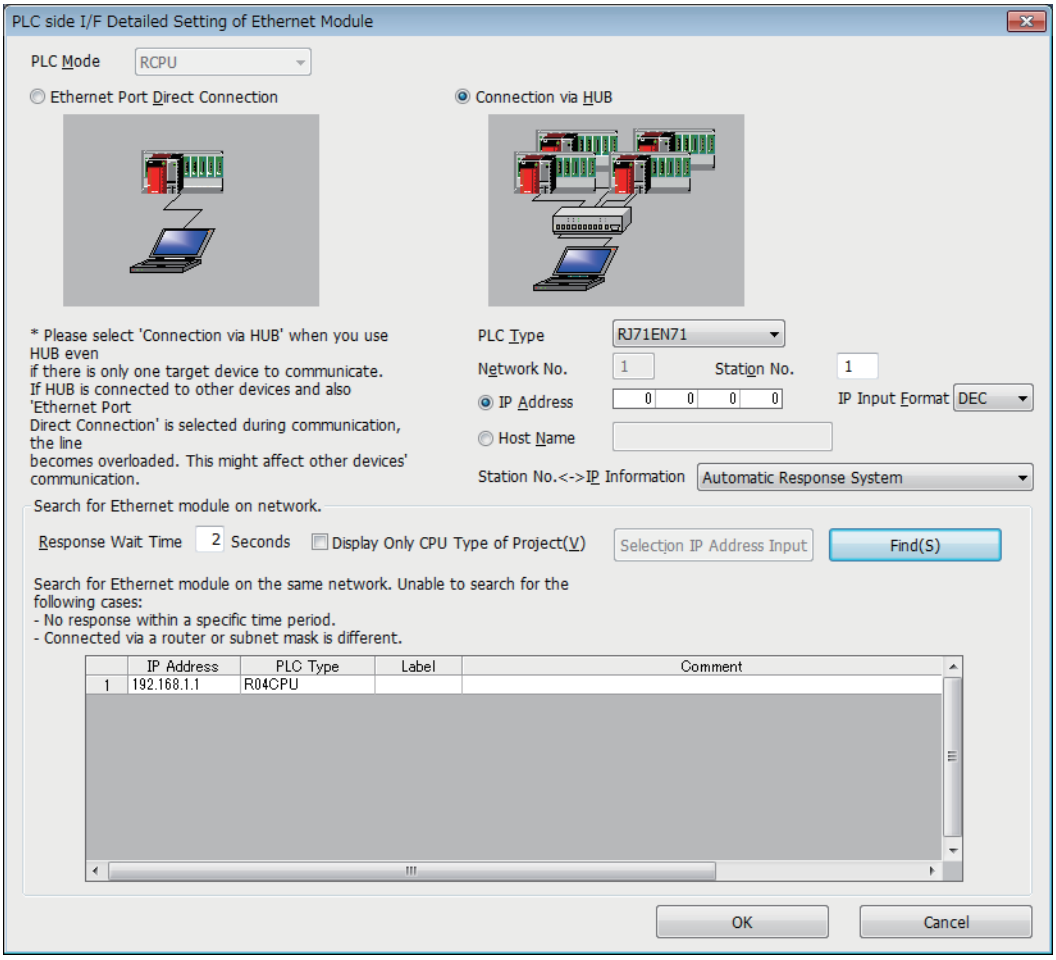
6. Select "Connection via HUB" for the connection method, and enter the station number and IP address or host name for the Ethernet-equipped module.

7. Set "Other Station Setting" or "Network Communication Route" if necessary.

*1 The network number and station number do not need to be set when connecting with the CPU module.

Searching modules on the network

When connecting with a hub, a list of modules that can be searched for will appear by clicking the [Find] button on the "PLC side I/F Detailed Setting" window.



■Search target modules

- The control CPU of the RJ71EN71 or the CPU module connected to the same hub as the engineering tool
- The control CPU of the RJ71EN71 or the CPU module connected to cascade-connected hub

Point

- By setting "Not Respond to Network CPU Module Search" in "Security" under "Application Settings" to "Do Not Respond", the modules will not be listed even if a search is performed.
- Only the MELSEC iQ-R Series Ethernet-equipped modules are searched.
- The RJ71EN71 in which the network type is set to "Q Compatible Ethernet" cannot be searched.

■When module does not appear after search

If a connected Ethernet-equipped module does not appear in the list after searching the modules on the network, check the following items.

- Search cannot be performed if it is disabled with the IP filter function.
- Modules connected via a router cannot be searched.
- If the module is connected via a wireless LAN, packet loss can prevent the Ethernet communication from stabilizing, and may inhibit the module search.
- If there are modules with the same IP address in the list, review the IP address parameter settings for the Ethernet-equipped module.
- If the service processing load of the search-target CPU module or CPU module with RJ71EN71 is high, it may not be possible to search for the corresponding module. If the search cannot be performed, increase the response wait time in the search dialog, and perform the search again.

Precautions

When the CPU module and engineering tool are connected with an Ethernet cable, if remote STOP or remote PAUSE has been executed from the engineering tool to another station's CPU module, perform the following step before turning the power off or resetting.

- Remote RUN
- Remote RESET

Direct connection

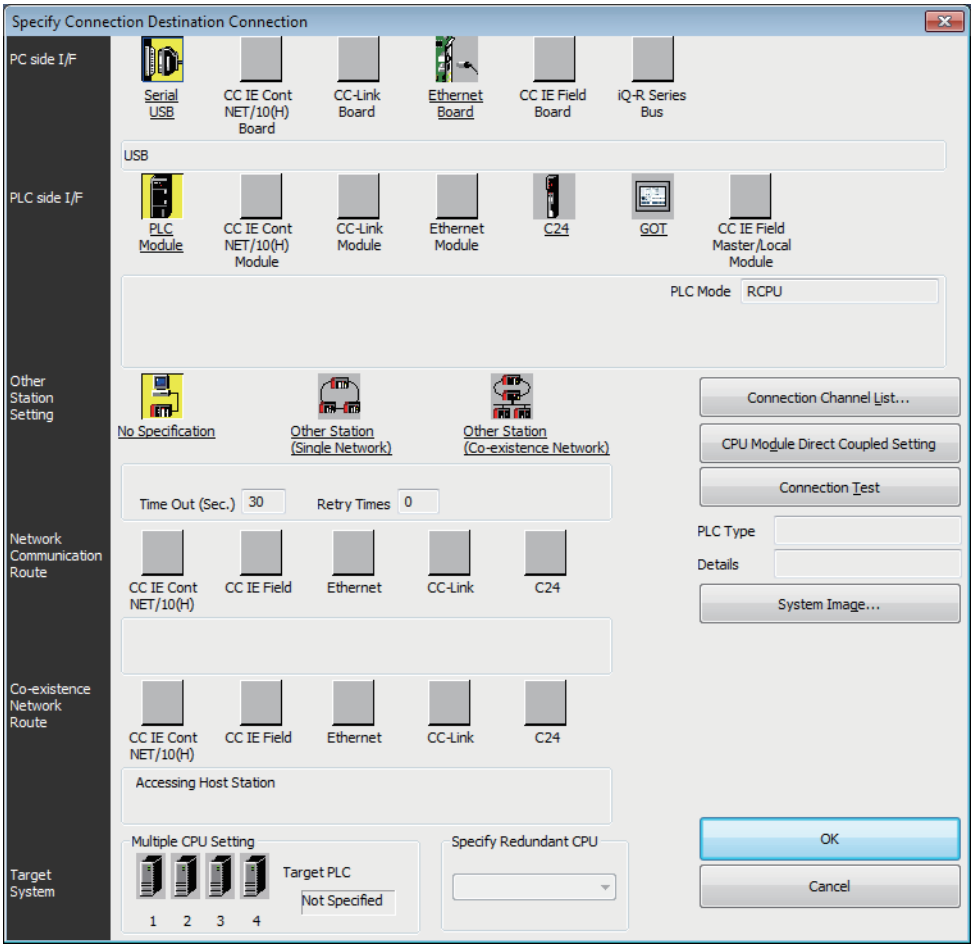
The Ethernet-equipped module and engineering tool can be directly connected with one Ethernet cable without using a hub. When directly connected, communication is possible without specifying the connection destination or without setting the IP address or host name. (Communicate using broadcast communications)

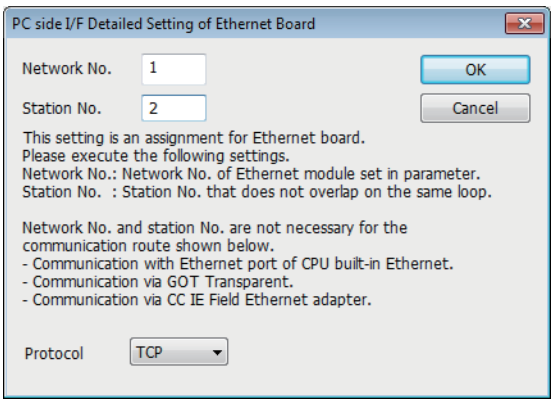
Point

- To prohibit direct connection with the Ethernet, set "Disable" for "Disable Direct Connection with MELSOFT" in "Security" under the "Application Settings".
- A direct connection is not possible when the RJ71EN71 network type is set to "Q Compatible Ethernet".

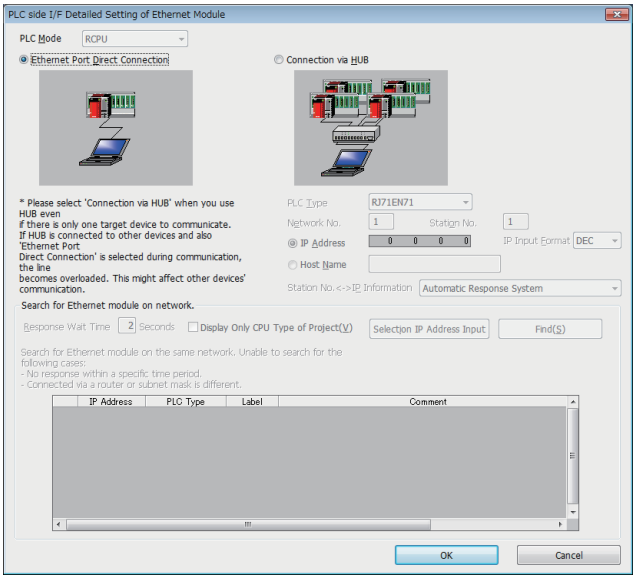
Set with "Specify Connection Destination".

[Online] ⇨ [Specify Connection Destination]




PC side I/F Detailed Setting of Ethernet Board
Network No.
1
Station No.
2
OK
Cancel
This setting is an assignment for Ethernet board.
Please execute the following settings.
Network No.: Network No. of Ethernet module set in parameter.
Station No. : Station No. that does not overlap on the same loop.
Network No. and station No. are not necessary for the communication route shown below.
- Communication with Ethernet port of CPU built-in Ethernet.
- Communication via GOT Transparent.
- Communication via CC IE Field Ethernet adapter.
Protocol
TCP

1. Set "PC side I/F" to "Ethernet Board".
2. Double-click "Ethernet Board", and open the "PC side I/F Detailed Setting of Ethernet board" window.
3. Set the network number, station number, and protocol of the personal computer. (Set the network number and protocol according to the settings for the Ethernet-equipped module. Set the station number so that it is not the same as a station number assigned to other Ethernet devices.)
4. Set the "PLC side I/F" to the module to be connected.


PLC side I/F Detailed Setting of Ethernet Module
PLC Mode
RCPU
Ethernet Port Direct Connection
Connection via HUB
* Please select 'Connection via HUB' when you use HUB even if there is only one target device to communicate. If HUB is connected to other devices and also 'Ethernet Port Direct Connection' is selected during communication, the line becomes overloaded. This might affect other devices' communication.
PLC Type
RJ71EN71
Network No.
Station No.
IP Address
IP Input Format
DEC
Host Name
Station No.<->IP Information
Automatic Response System
Search for Ethernet module on network.
Response Wait Time
Seconds
Display Only CPU Type of Project(V)
Selection IP Address Input
Find(S)
Search for Ethernet module on the same network. Unable to search for the following cases:
- No response within a specific time period.
- Connected via a router or subnet mask is different.
IP Address
PLC Type
Label
Comment
OK
Cancel

5. Double-click the icon set in step 4, and open the "PLC side I/F Detailed Setting" window.
6. Select "Ethernet Port Direct Connection" for the connection method.

Point

When connecting directly with the CPU module, setting also possible by clicking the [CPU Module Direct Coupled Setting] button on the "Specify Connection Destination" window.

Precautions

■Connection with LAN line

Do not connect with a LAN line and set direct connection. Data will be sent to all external devices on the LAN line, so this setting will cause the line load to increase and will affect communication with other external devices.

■Connections that are not direct connections

- Do not use a configuration in which the Ethernet-equipped module and external device are connected with a hub. A direct connection is not established when the devices are connected with a hub.
- When creating a network connection on the personal computer side, communication with a direct connection is not possible if two or more Ethernet ports are set to "Enable". Review the personal computer settings so that only the Ethernet port for the direct connection is set to "Enable", and the other Ethernet ports are set to "Disable".

■Settings incompatible with direct connection

When using the RJ71EN71, a direct connection cannot be established if the following setting is made with "Specify Connection Destination" of the engineering tool.

- When "Other Station (Co-existence Network)" is selected for "Other Station Setting"
- When "Other Station (Single Network)" is selected for "Other Station Setting", and "Other station in the same loop or access to multilevel system" is selected in the "Network Communication Route Detailed Setting of Ethernet" window

■Functions incompatible with direct connection

The following functions cannot be used when the RJ71EN71 is directly connected. To use the following functions, connect the CPU module directly or with a USB cable.

- CC-Link IE Field Diagnostics
- CC-Link IE Control Diagnostics

■Conditions that cannot communicate with direct connection

Communication with a direct connection may be disabled if the following conditions apply. If connection is not possible, review the settings for the Ethernet-equipped module and personal computer.

- When all bits of the IP address for the Ethernet-equipped module that correspond with the 0 section of the subnet mask for the personal computer are on or off

Ex.

IP address for the Ethernet-equipped module: 64.64.255.255

IP address for the personal computer: 64.64.1.1

Subnet mask for the personal computer: 255.255.0.0

- When all bits of the IP address for the Ethernet-equipped module that correspond with the host address of each class in the IP address for the personal computer are on or off

Ex.

IP address for the personal computer: 192.168.0.1 ← 192.x.x.x., class C and the host address is the fourth octet.

Subnet mask for the personal computer: 255.0.0.0

IP address for the Ethernet-equipped module: 64.64.255.255 ← each bit turns on because of the fourth octet is 255

Point

The IP address for each class are as follow.

- Class A: 0.x.x.x to 127.x.x.x
- Class B: 128.x.x.x to 191.x.x.x
- Class C: 192.x.x.x to 223.x.x.x

The host address for each class is the 0 section shown below.

- Class A: 255.0.0.0
- Class B: 255.255.0.0
- Class C: 255.255.255.0

1.2 SLMP Communications

SLMP is a protocol used by external devices to access SLMP-compatible devices via the Ethernet.

SLMP communications are available among devices that can receive/send messages with the SLMP control procedure.

The Ethernet-equipped module processes and transfers data following instructions (command) from the external device, so the programmable controller only needs the open/close processing and does not require a program for data communication.

For SLMP communications, refer to the following.

SLMP Reference Manual

Applications

This section describes the applications of SLMP communications.

Data read/write

Data read/write can be executed for the following data. With this, the external device can monitor the operation of the Ethernet-equipped module, analyze data, and control production.

- Device or global label of the CPU module connected with the RJ71EN71 (When the Ethernet function of the RJ71EN71 is used)
- Device or global label of the CPU module (When the Ethernet function of the CPU module is used)
- Buffer memory of the intelligent function module

File read/write

Files such as programs and parameters stored in the CPU module can be read/written. The CPU module files can be managed with the external device, the execution file and others can be exchanged from the external device.

Remote control of a CPU module

A CPU module can be remotely controlled from the external device using remote operations.

Remote password lock/unlock

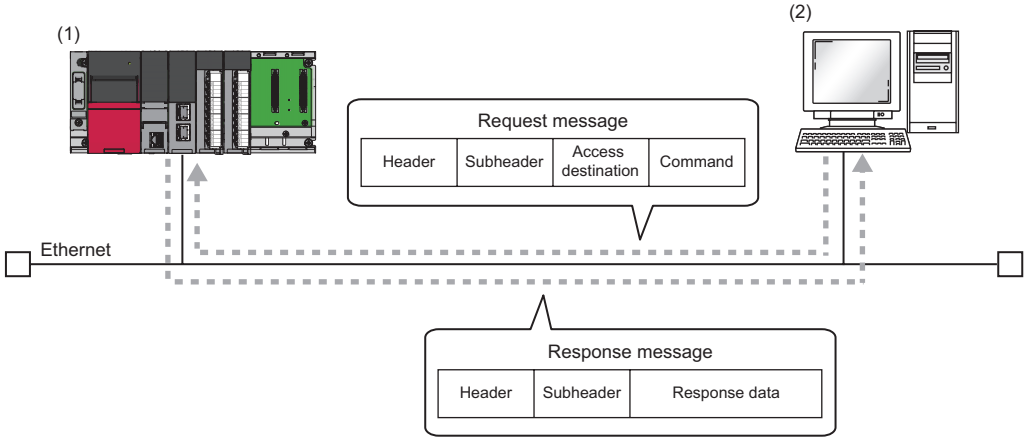
The remote password can be locked and unlocked from the external device.

Access to the programmable controller on another station via other network

In systems with CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 or Ethernet, the programmable controller on another station can be accessed from the external device via the network.

Communication structure

When a message is sent from the external device to the Ethernet-equipped module using the SLMP message format, the Ethernet-equipped module executes a processing corresponding to the received message. During communication, the Ethernet-equipped module functions as a server and the external device (terminals such as a personal computer) functions as the client. The server (Ethernet-equipped module) automatically returns a response message suitable for the request message received from the client.



(1) Server side: Ethernet-equipped module
(2) Client side: External device

Data communication procedures

This section describes the procedures for communicating with SLMP.

1. After the module parameters are set, the system checks that the initial processing of the Ethernet-equipped module has ended normally. ('Initial status' (Un\G1900024.0): On)
2. Perform the open processing to establish a connection between the Ethernet-equipped module and external device. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
3. After the connection is established, the SLMP messages are sent from the external device.
4. Close the connection when communication is finished.

Point

In the following case, the Ethernet-equipped module performs a remote password check when the external device is accessing the programmable controller. If communication is not possible, unlock the remote password. (☞ Page 116 Access permit processing (Unlock processing))

- When remote password is set for the CPU module
- When connection for exchanging data with external device is set as a remote password check target

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select "SLMP Connection Module" in "Module List" and drag it to "List of devices" or "Device map area".
2. Set the other items to the connection if required.

Communications using an auto-open UDP port

The auto-open UDP port is used for communication with SLMP.

The auto-open UDP port is a UDP/IP port that automatically opens and closes at the following timing. When this port is used, communication is enabled when the initial processing is completed. Communication can be performed without a program regardless of the connection's open status

■Open/close timing

After the Ethernet-equipped module initial processing completes, the port automatically opens according to the registered parameter settings. The port automatically closes when the power for the Ethernet-equipped module station turns off or is reset.

Point

- When the initial processing ends normally, the Ethernet-equipped module enables communications using an automatic open UDP port. The module waits for a communication request to the Ethernet-equipped module on the own station. (Automatic open)
- The Ethernet-equipped module accepts and processes requests from anywhere as long as they are addressed to the Ethernet-equipped module itself.
- If a communication request is received from an external device, the corresponding port number is occupied until that processing ends. Even if another communication request is accepted during this time, the communication processing will be waited.

List of valid commands

The following table lists the commands that can be executed from the external device to the Ethernet-equipped module.

"☐" in the "Sub-command" field differs according to the specified device.

For details on each command, refer to the following.

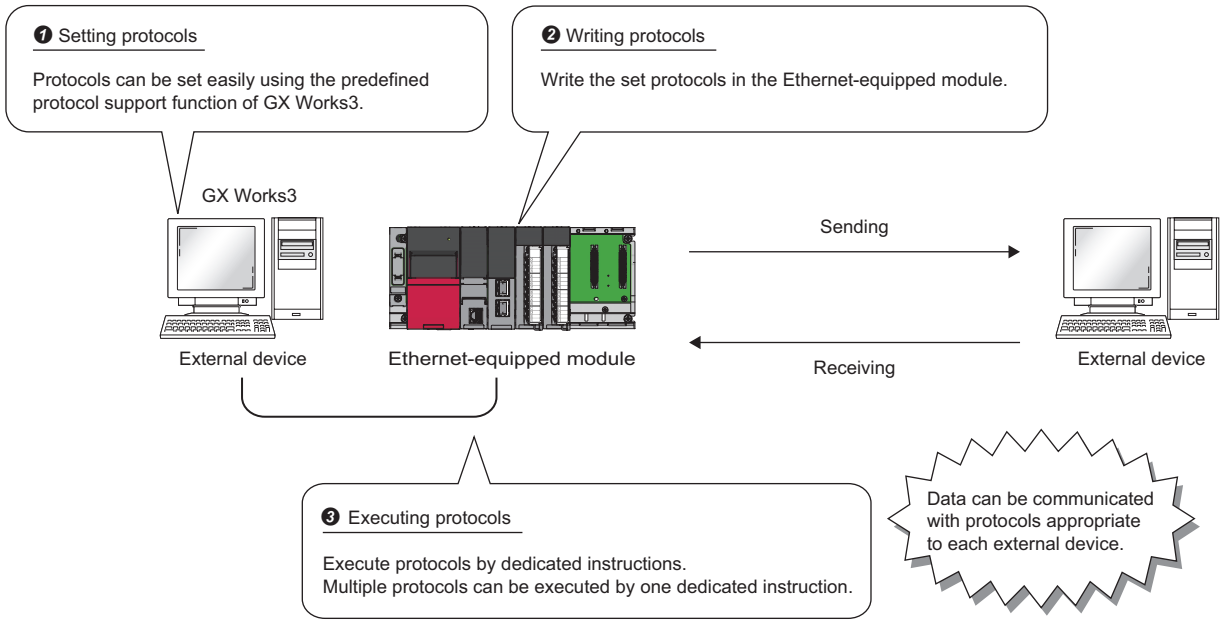
SLMP Reference Manual

Item		Command	Sub command	Description
Type	Operation			
Device	Read	0401	00☐1	Reads value from the bit devices (consecutive device No.) in one-point units.
			00☐0	• Reads values from the bit device (consecutive device No.) in 16-point units. • Reads value from the word devices (consecutive device No.) in one-word units.
			00☐3	Writes value to the bit devices (consecutive device No.) in one-point units.
			00☐2	• Writes value to the bit devices (consecutive device No.) in 16-point units. • Writes value to the word devices (consecutive device No.) in one-word units.
	Write	1401	00☐1	Writes value to the bit devices (consecutive device No.) in one-point units.
			00☐0	• Writes value to the bit devices (consecutive device No.) in 16-point units. • Writes value to the word devices (consecutive device No.) in one-word units.
			00☐3	Writes value to the bit devices (consecutive device No.) in one-point units.
			00☐2	• Writes value to the bit devices (consecutive device No.) in 16-point units. • Writes value to the word devices (consecutive device No.) in one-word units.
	Read Random	0403	00☐0	Specifies the device number and reads value from the word devices in one-word units or two-word units. This can be specified with inconsecutive device No.
			00☐2	Specifies the device number and reads value from the word devices in one-word units or two-word units. This can be specified with inconsecutive device No.
	Write Random	1402	00☐1	Specifies the device No. to bit device in one-point units and writes value. This can be specified with inconsecutive device No.
			00☐0	• Specifies the device No. to bit device in 16-point units and writes value. This can be specified with inconsecutive device No. • Specifies the device No. to word device in one-word units or two-word units and writes value. This can be specified with inconsecutive device No.
			00☐3	Specifies the device No. to bit device in one-point units and writes value. This can be specified with inconsecutive device No.
			00☐2	• Specifies the device No. to bit device in 16-point units and writes value. This can be specified with inconsecutive device No. • Specifies the device No. to word device in one-word units or two-word units and writes value. This can be specified with inconsecutive device No.
	Entry Monitor Device	0801	00☐0	Registers the device to be read by Execute Monitor (command: 0802).
			00☐2	
	Execute Monitor	0802	0000	Reads the value of device registered by Entry Monitor Device (command: 0801).
	Read Block	0406	00☐0	Reads data by treating n points of word devices or bit devices (one point is equivalent to 16 bits) as one block and specifying multiple blocks. This can be specified with inconsecutive device No.
			00☐2	
	Write Block	1406	00☐0	Writes data by treating n points of word devices or bit devices (one point is equivalent to 16 bits) as one block and specifying multiple blocks. This can be specified with inconsecutive device No.
			00☐2	
Label	Array Label Read	041A	0000	Reads data from array type labels or labels whose structure members are the array.
	Array Label Write	141A	0000	Writes data to array type labels or labels whose and structure members are the array.
	Read Random	041C	0000	Specifies labels and reads the data.
	Write Random	141B	0000	Specifies labels and writes data.
Memory	Read	0613	0000	Reads the buffer memory data of own station (SLMP-compatible device).
	Write	1613	0000	Writes the data in the buffer memory of own station (SLMP-compatible device).
Extend Unit	Read	0601	0000	Reads the data in the buffer memory of intelligent function module.
	Write	1601	0000	Writes the data in the buffer memory of intelligent function module.

Item		Command	Sub command	Description
Type	Operation			
Remote Control	Remote Run	1001	0000	Executes the remote RUN to the access destination module.
	Remote Stop	1002	0000	Executes the remote STOP to the access destination module.
	Remote Pause	1003	0000	Executes the remote PAUSE to the access destination module.
	Remote Latch Clear	1005	0000	Executes the Remote Latch Clear to the access destination module.
	Remote Reset	1006	0000	Executes the Remote RESET to the access destination module.
	Read Type Name	0101	0000	Reads the model name and model code of the access destination module.
Remote Password	Lock	1631	0000	Specifies the remote password to disable the communication with other devices. (The locked state is activated from the unlocked state.)
	Unlock	1630	0000	Specifies the remote password to enable communication with other devices. (The unlocked state is activated from the locked state.)
File	Read Directory/ File	1810	0040	Reads file list information.
	Search Directory/ File	1811	0040	Reads the presence of the specified file, file No., and file size.
	New File	1820	0040	Reserves storage area for the specified file.
	Delete File	1822	0040	Deletes a file.
	Copy File	1824	0040	Copies the specified file.
	Change File State	1825	0040	Changes file attributes.
	Change File Date	1826	0040	Changes the file creation date.
	Open File	1827	0040	Locks a file so that the content of the file is not changed by other devices.
	Read File	1828	0000	Reads the data of a file.
	Write File	1829	0000	Writes the contents in a file.
	Close File	182A	0000	Cancels the file lock by open processing.
Self Test		0619	0000	Tests whether the communication with external devices is normally executed or not.

1.3 Communications Using the Predefined Protocol

Data can be exchanged between the external device (such as measuring instrument and bar code reader) and the CPU module following the protocol of the device.
Data that varies according to communication session can be handled by incorporating a device or buffer memory into the communication packet.
Sets the protocol required for communication with the external device using the engineering tool.
The protocol can be set by selecting from the predefined protocol library, or it can be created and edited.


❶ Setting protocols
Protocols can be set easily using the predefined protocol support function of GX Works3.
❷ Writing protocols
Write the set protocols in the Ethernet-equipped module.
GX Works3
Sending
External device
Ethernet-equipped module
Receiving
External device
❸ Executing protocols
Execute protocols by dedicated instructions.
Multiple protocols can be executed by one dedicated instruction.
Data can be communicated with protocols appropriate to each external device.

Point

The number of protocols and packets that can be registered is as follow.

- Protocols: 128 maximum
- Packets: 256 maximum
- Packet data area size: 12288 bytes maximum

When the number of packets reaches the upper limit, protocols cannot be added even if the number of protocols has not reached the upper limit. If the packet data area size reaches the upper limit, protocols and packets cannot be added even if the number of protocols and packets has not reached the upper limit.

Applicable connections

The connections No.1 to 16 of the P1 connector can be used for the communications using the predefined protocol.
Communications using the predefined protocol cannot be used with the P2 connector.

Data communication procedures

When the predefined protocol support function is used, data can be exchanged with the external device using the following procedure.

1. Select, create or edit the protocol with the predefined protocol support function, and write the protocol setting data. (☞ Page 29 Creating the protocol setting data)
2. Set the module parameter. (☞ Page 34 Setting procedure)
3. Write the parameters to the CPU module, and check that initial processing of the Ethernet-equipped module completed successfully. ('Initial status' (Un\G1900024.0): On)
4. Perform the open processing to establish a connection between the Ethernet-equipped module and external device. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
5. Execute the protocol with the dedicated instruction (SP.ECPRTCL instruction or GP.ECPRTCL instruction).
6. Close the connection when communication is finished.

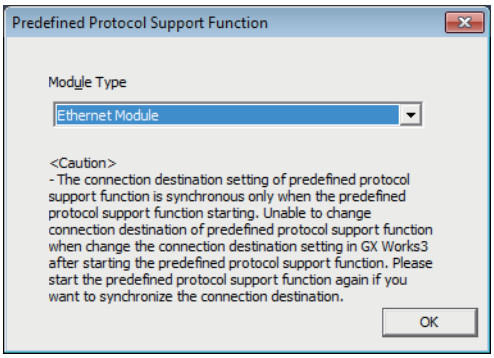
Point

The communication data code is binary code communication regardless of the selected settings.

Creating the protocol setting data

Use the predefined protocol support function to create the protocol setting data.

[Tool] ⇨ [Predefined Protocol Support Function]

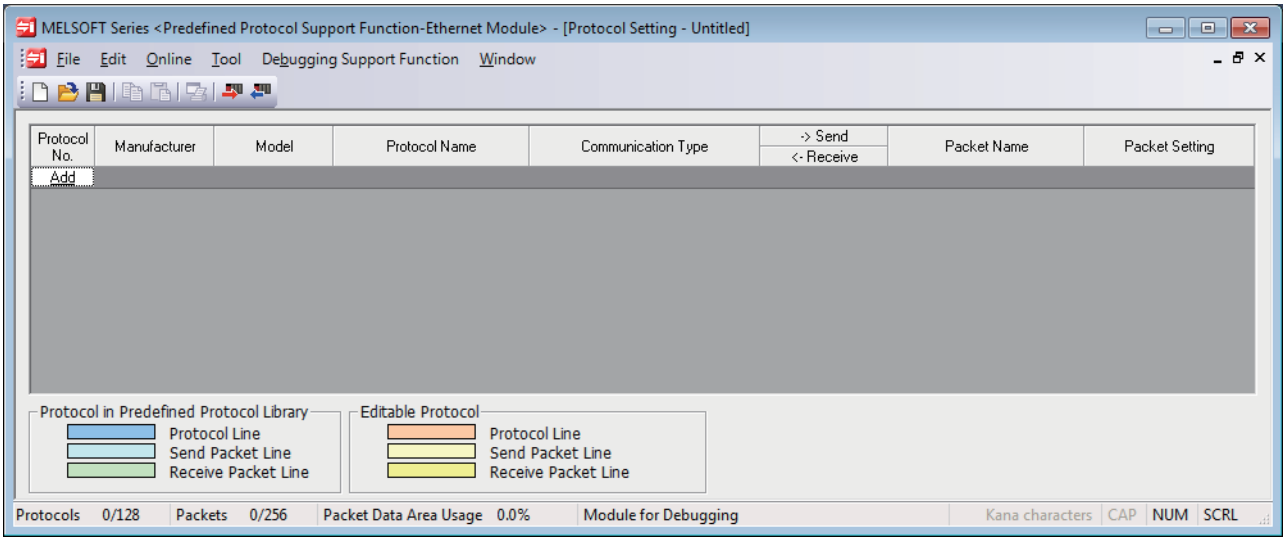

Predefined Protocol Support Function
Module Type
Ethernet Module
<Caution>
- The connection destination setting of predefined protocol support function is synchronous only when the predefined protocol support function starting. Unable to change connection destination of predefined protocol support function when change the connection destination setting in GX Works3 after starting the predefined protocol support function. Please start the predefined protocol support function again if you want to synchronize the connection destination.
OK

1. Select the module for which to create the protocol setting data.

■Newly creating the protocol setting data

Newly create the protocol setting data.

[File] ⇨ [New]

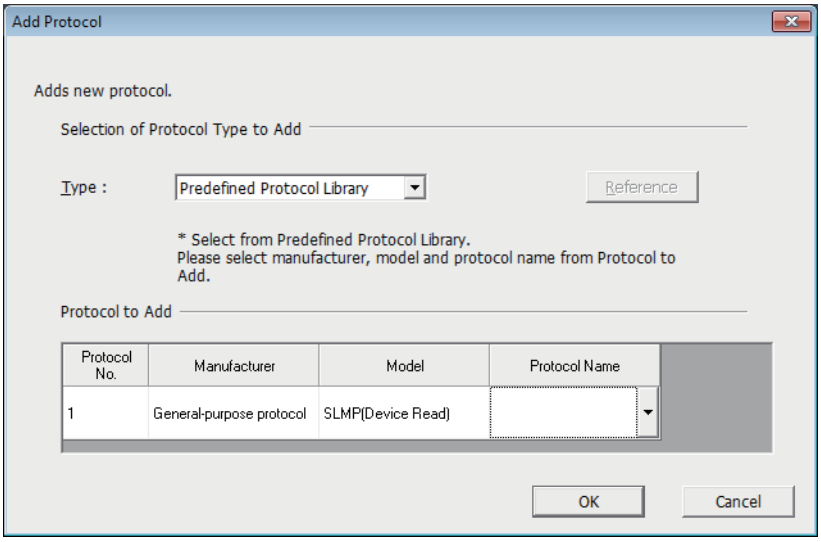


Item	Description
Protocol No.	Displays the protocol number used with the dedicated instruction in the program.
Manufacturer	Displays the name of the manufacturer of the device for which the protocol is being set.
Model	Displays the model of the protocol to be set.
Protocol Name	Displays the name of the protocol to be set.
Communication Type	Displays the communication type of the protocol to be set. Send only: Sends one send packet once. Receive only: If there is a matching packet within up to 16 registered and received packets, it is received. Send & receive: After sending one send packet, if there is a matching packet within up to 16 registered and received packets, it is received.
→Send/←Receive	Displays the packet send direction. →: For send ←(1) to (16): For receive, the received packet number is displayed in parentheses.
Packet Name	Displays the packet name.
Packet Setting	Displays the validity of variables in the packet elements and the variable setting state. If the variable is not set, there are no elements, or there is an element error, the protocol is not written to the Ethernet-equipped module. No Variable: When there is no variable in the elements Variable Set: Only when all variables have been set Variable Unset: When there is even one unset variable Elements Unset: When there are no elements in an editable protocol Element Error: When elements do not satisfy requirements

■Adding protocol

Add protocol.

[Edit] ⇨ [Add Protocol]



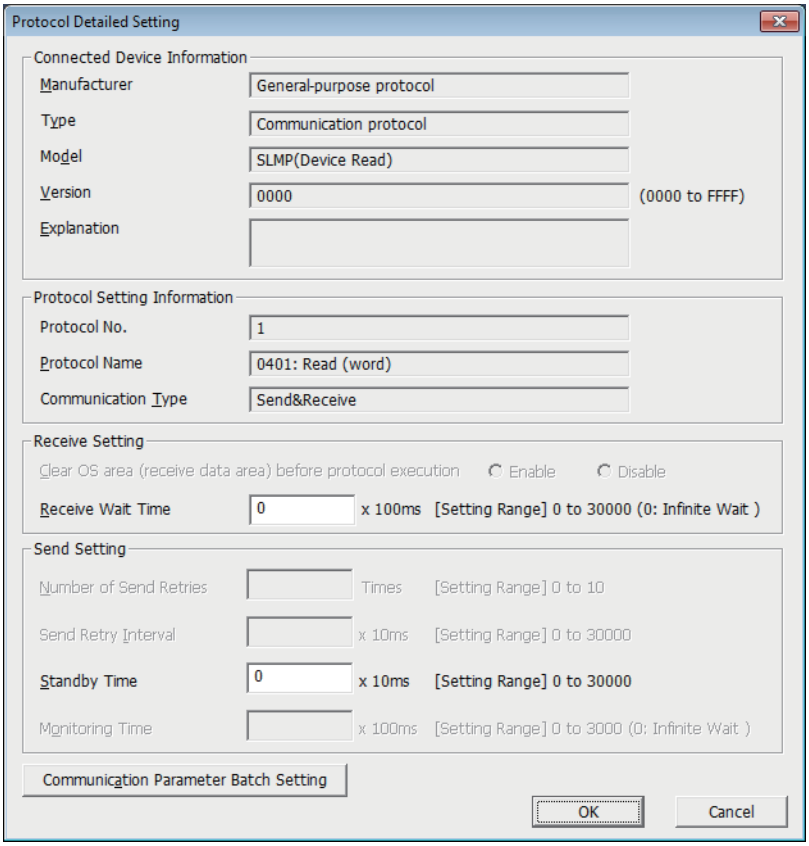
Item	Description	Setting range
Type	Select the type of protocol to be added.	• Predefined Protocol Library • User Protocol Library • Add New
Protocol No.	Select the protocol number to be added.	1 to 128
Manufacturer*1	Set the maker of the protocol to be added.	—
Model*1	Set the type of protocol to be added.	—
Protocol Name*1	Set the name of the protocol to be added.	—

*1 The name can be set only when "Predefined Protocol Library" is selected for "Type"

■Protocol Detailed Setting

Set the protocol send/receive parameters.

"Protocol Setting" window ⇨ Select a protocol ⇨ [Edit] ⇨[Protocol Detailed Setting]



Item		Description
Connected Device Information*1	Manufacturer	Set the protocol maker name.
	Type	Set the protocol device type.
	Model	Set the protocol model.
	Version	Set the protocol device version.
	Description	Set a description of the protocol device.
Protocol setting information*1	Protocol No.	The protocol number for the selected protocol is displayed.
	Protocol Name	Set the protocol name.
	Communication Type	Set the protocol communication type.
Receive Setting	Receive Wait Time	Set the time for wait after the module enters the receive data wait state. If communication with the external device is disabled because of a disconnection and matching packet data is not received within the specified time, the module judges that an error has occurred and cancels the receive data wait state.
Send Setting	Send Wait Time	Set the time to wait from when the protocol set for the module enters the execution state to when the data is actually sent. The time for the external device to enter the receive enable state can be adjusted with this in respect to the module's send timing.

*1 The setting cannot be changed if the protocol was selected from the predefined protocol library.

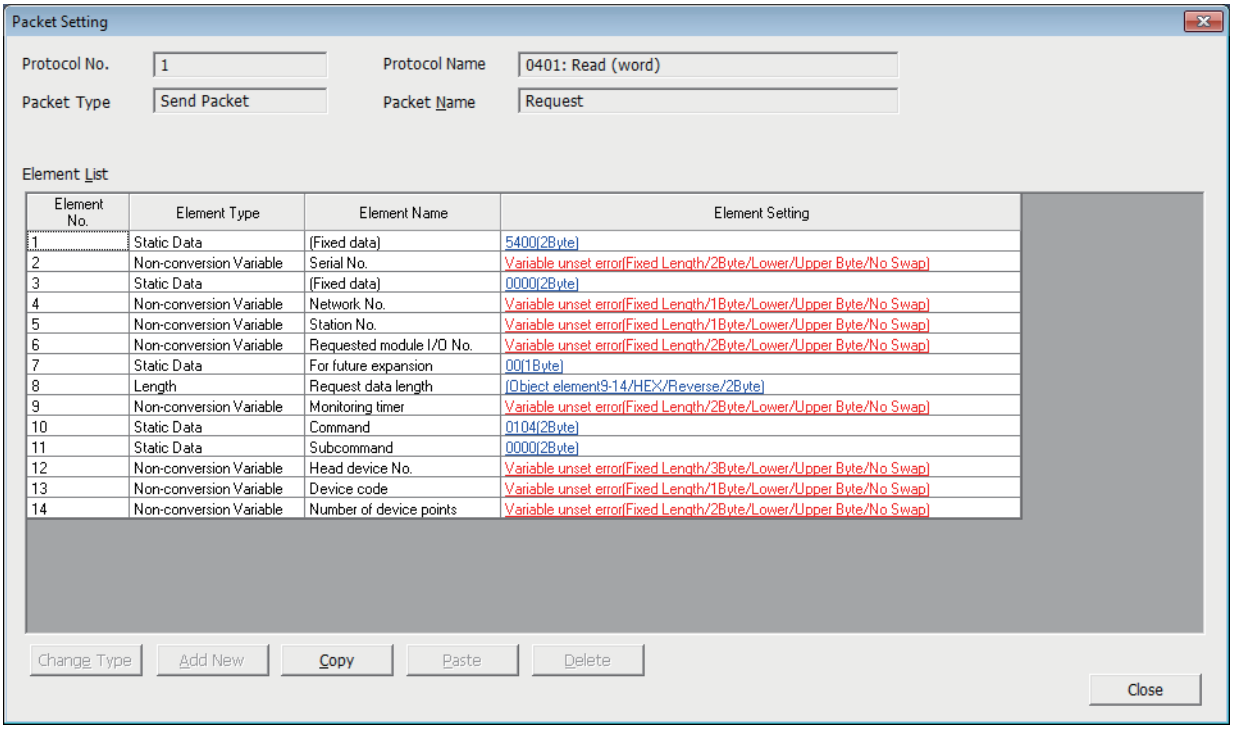
Point

Send/receive parameters can be set for multiple protocols by clicking the [Communication Parameter Batch Setting] button and setting the range of the set protocol numbers, receive settings, and send settings.

■Packet setting

Set the configuration of the send/receive packets on the "Packet Setting" window.

"Protocol Setting" window ⇨ Packet to be set


Packet Setting
Protocol No.
1
Protocol Name
0401: Read (word)
Packet Type
Send Packet
Packet Name
Request
Element List
Element No.
Element Type
Element Name
Element Setting
1 Static Data (Fixed data) 5400[2Byte]
2 Non-conversion Variable Serial No. Variable unset error[Fixed Length/2Byte/Lower/Upper Byte/No Swap]
3 Static Data (Fixed data) 0000[2Byte]
4 Non-conversion Variable Network No. Variable unset error[Fixed Length/1Byte/Lower/Upper Byte/No Swap]
5 Non-conversion Variable Station No. Variable unset error[Fixed Length/1Byte/Lower/Upper Byte/No Swap]
6 Non-conversion Variable Requested module I/O No. Variable unset error[Fixed Length/2Byte/Lower/Upper Byte/No Swap]
7 Static Data For future expansion 00[1Byte]
8 Length Request data length [Object element9-14/HEX/Reverse/2Byte]
9 Non-conversion Variable Monitoring timer Variable unset error[Fixed Length/2Byte/Lower/Upper Byte/No Swap]
10 Static Data Command 0104[2Byte]
11 Static Data Subcommand 0000[2Byte]
12 Non-conversion Variable Head device No. Variable unset error[Fixed Length/3Byte/Lower/Upper Byte/No Swap]
13 Non-conversion Variable Device code Variable unset error[Fixed Length/1Byte/Lower/Upper Byte/No Swap]
14 Non-conversion Variable Number of device points Variable unset error[Fixed Length/2Byte/Lower/Upper Byte/No Swap]
Change Type
Add New
Copy
Paste
Delete
Close

The above window opens when "Predefined Protocol Library" is selected on the "Add Protocol" window.

When "Add New" or "User Protocol Library" has been selected, configure the packets with the [Change Type] button and [Add New] button.

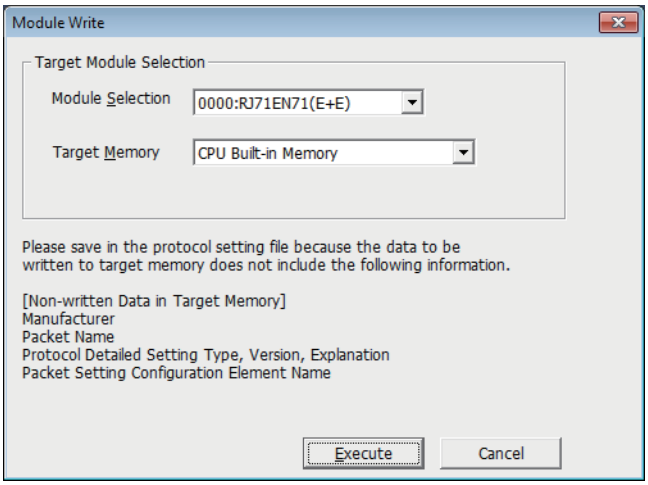
For details on the packet elements, refer to the following.

☞ Page 36 Packet elements

■Writing the protocol setting data

Write the protocol setting data to the Ethernet-equipped module.

[Online] ⇨ [Write to Module]


Module Write
Target Module Selection
Module Selection
0000:RJ71EN71(E+E)
Target Memory
CPU Built-in Memory
Please save in the protocol setting file because the data to be written to target memory does not include the following information.
[Non-written Data in Target Memory]
Manufacturer
Packet Name
Protocol Detailed Setting Type, Version, Explanation
Packet Setting Configuration Element Name
Execute
Cancel

Select the module and memory into which the protocol data is to be written, and execute write.

When writing to a CPU module, the protocol setting data is written into the module extension parameters.

Point

The following data is not written as the protocol setting data so it will not be displayed even when read.
However, when the protocol is selected from the predefined protocol library, the following can be displayed.

- Manufacturer
- Packet name
- Type, version, and explanation in the protocol detailed setting
- Element name in packet settings

When the predefined protocol settings are written into multiple target memories, the following operation will take place.
When written into both the CPU module memory and SD memory card:
Operation follows settings in "Memory Card Parameter".
When written in the CPU module memory or SD memory card, and the RJ71EN71.
The predefined protocol settings in the CPU module memory or SD memory card are enabled at the following timing. (When written into both the CPU module memory and SD memory card, operation follows the settings in "Memory Card Parameter".)
As soon as the settings are disabled, the RJ71EN71 predefined protocol settings are overwritten by the predefined protocol settings in the CPU module or SD memory card.

- When the system is powered off and on
- When the CPU module is reset
- When the status of the CPU module changed from STOP to RUN state

The predefined protocol settings written in the SD memory card can be transferred to the CPU module memory by using boot operation. For details on boot operation, refer to the following.
MELSEC iQ-R CPU Module User's Manual (Application)

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select the external device to be connected in "Module List" and drag it to "List of devices" or "Device map area".

External device name	Description
UDP Connection Module	Select to communicate with the external device using UDP/IP
Active Connection Module	Select to perform the open processing to the external device from the Ethernet-equipped module (Active open) and communicate using TCP/IP.
Unpassive Connection Module	Select to receive the open processing from a unspecified external device (Unpassive open) and communicate using TCP/IP.
Fullpassive Connection Module	Select to receive the open processing from the specified external device (Fullpassive open) and communicate using TCP/IP.

2. Set "Communication Procedure" for the external device to "Predefined Protocol".

3. Set the other parameters required for communication in the connection.

Applicable dedicated instructions

The dedicated instructions used for communications using the predefined protocol are shown below.
○: Usable, ×: Not usable

Instruction	Description	Availability	
		RJ71EN71	CPU module
GP.ECPRTCL	Executes the protocol registered with the predefined protocol support function of the engineering tool.	○	×
SP.ECPRTCL		×	○

Protocol communication type

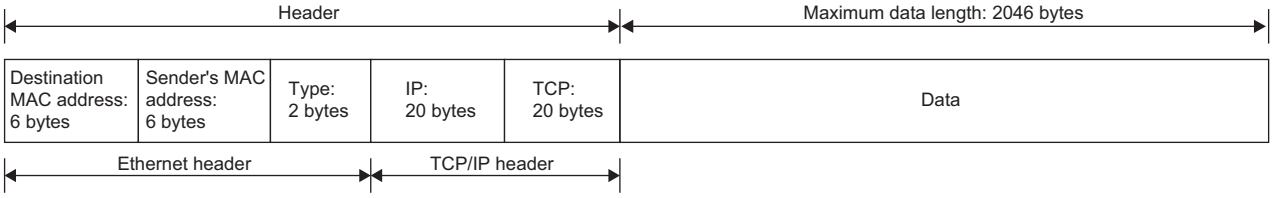
The packets sent to the external device when a processing is executed and the external device's receive packets are registered in the protocol.

The packet elements set with the predefined protocol support function are the data section of the packets that are actually sent and received.

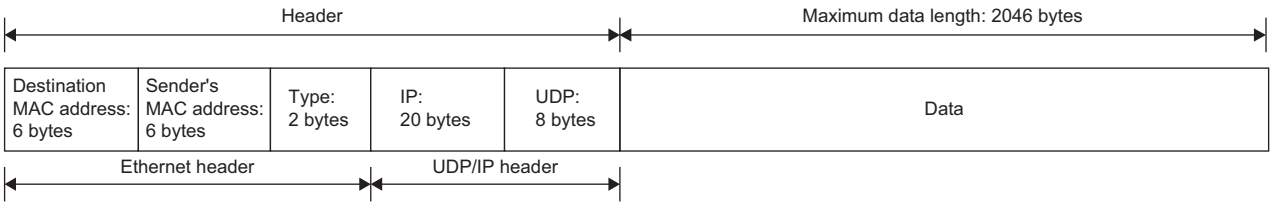
This section describes an example of the packet configuration. For details on the packet elements, refer to the following.

☞ Page 230 Operation Image and Data Structure of Predefined Protocol

For TCP/IP



For UDP/IP



With the predefined protocol support function, data is exchanged with the external device with the procedures (communication type) shown below.

For details on the communication type operation, refer to the following.

☞ Page 230 Operation Image and Data Structure of Predefined Protocol

Communication type	Description
Send only	The send packet is sent once.
Receive only	If there is a packet that matches within the maximum of 16 registered receive packets, the packet is received.
Send & receive	After sending the send packets, if there are packets that match the up to 16 registered receive packets, the packets are received.

Packet elements

The packet is created with a combination of packet elements.

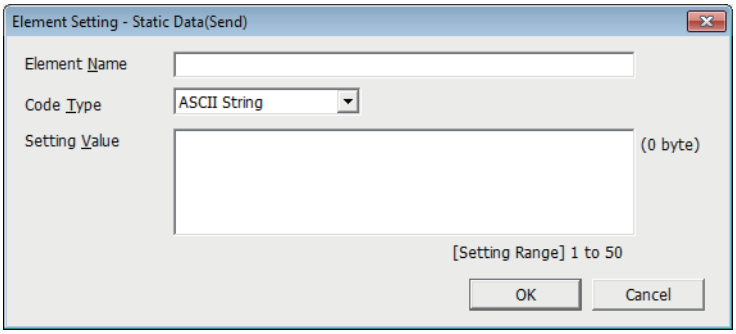
Up to 32 elements can be set in one packet. One packet can have a maximum data length of 2046.

This section describes the details of the packet elements.

For examples of the packet element data, refer to the following.

☞ Page 230 Operation Image and Data Structure of Predefined Protocol

Static data



Use when there are specific codes and character strings, such as commands, in the packet.

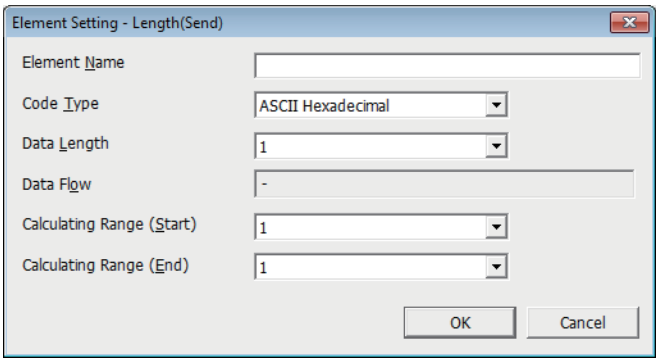
- When sending: The specified code and character string are sent.
- When receiving: The received data is verified.

Multiple static data elements can be placed anywhere in the data part.

The following table lists the items.

Item	Description	Remarks
Element Name	Set the element name.	—
Code Type	Select a data type of the setting value. ASCII string/ASCII control code/HEX	—
Setting Value	Set data within 1 to 50 bytes. Code type and setting range are as follows: • ASCII string: 20H to 7EH • ASCII control code: Control code of 00H to 1FH and 7FH • HEX: Hexadecimal data of 00H to FFH	Setting example ASCII string: "ABC" ASCII control code: STX HEX: FFFF

Length



The length code is used when there is an element that indicates the data length in the packet.

- When sending: Automatically calculates the data length in the specified range, and adds it to the packet.
- When receiving: From the received data, the data (value) corresponding to the length is verified as the specified range's data length.

Length elements can be placed anywhere in the data part.

Multiple length elements can be set placed in one packet.

The following table lists the items.

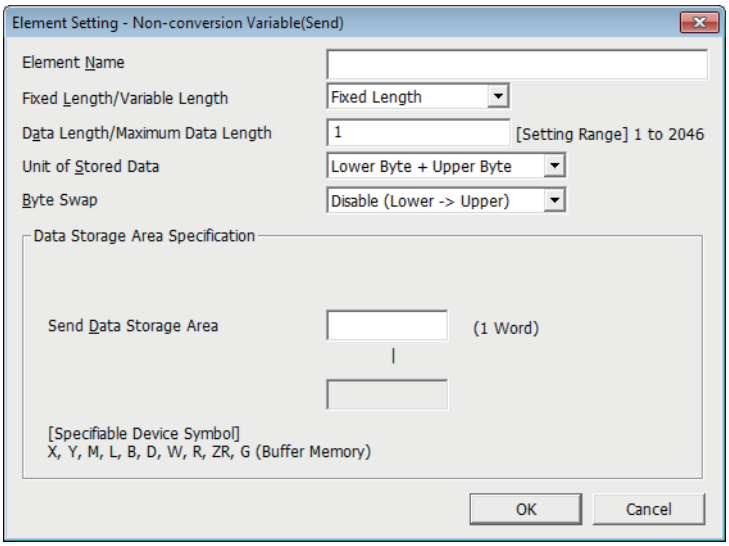
Item		Description		Remarks
Element Name		Set the element name.		—
Code Type		Select the data length type. ASCII hexadecimal/HEX		—
Data Length		Select the data length on the line. The range is 1 to 4 bytes.		—
Data Flow		Forward Direction (Upper byte → Lower byte)	When sending: Sends the calculated length in order from the upper byte. When receiving: Receives the data in order from the upper byte.	This cannot be set if the data length is 1 byte.
		Reverse Direction (Lower byte → Upper byte)	When sending: Sends the calculated length in order from the low-order byte. When receiving: Receives the data in order from the low-order byte.	
		Byte Swap (by Word)*1	When sending: Interchanges the bytes in word units and sends the calculated length. When receiving: Interchanges the bytes in word units and receives the data.	
Calculating Range	Start	Select the start packet element number for the range to be calculated. The range is 1 to 32.		—
	End	Select the end packet element number for the range to be calculated. The range is 1 to 32.		

*1 This can be selected only when the data length is set to 4 bytes.

Point

- If there are no elements other than length, an element error occurs. (When using length, one or more elements other than length are required.)
- If the calculation result exceeds the number of digits set with "Data Length", the excessive digit value is discarded (invalidated). For example, if the data length is 2 bytes and the data size calculation results are "123" bytes, the data length will be "23".
- If there is a non-conversion variable (variable length)/non-verified reception (character length variable) after the length, and that section is not included in the length calculating range, arrange the static data immediately after the non-conversion variable/non-verified reception.
- When the code type setting is "ASCII Hexadecimal", a mismatch will occur if a character string other than "0" to "9", "A" to "F", and "a" to "f" is received.
- Use "0" to "9" or "A" to "F" when converting to ASCII characters during send.
- When arranging multiple length elements, none of the length calculating range may overlap.
- When arranging multiple length elements, the previous length calculating range may not exceed the arranged length.
- A length element cannot be arranged at the final position of the packet elements.

Non-conversion variable



Use this to send the CPU module device or buffer memory data as part of the send packet, or to store part of the received packet in the CPU module device or buffer memory.

Multiple non-conversion variable can be arranged in one packet.

The following table lists the items.

Item	Description	
Element Name	Set the element name.	
Fixed Length/Variable Length	Fixed Length	The data whose length is fixed is sent and received.
	Variable Length	When sending: The data length is specified at the time of the protocol execution and the data is sent. When receiving: The data whose length is variable is received.
Data Length/Maximum Data Length	Set the data length of the send/receive data. (For a variable length, set the maximum data length that can be specified for the data length storage area.) The range is 1 to 2046.	
Unit of Stored Data	Lower byte + Upper byte	When sending: Each one word (2 bytes) data in the data storage area is sent in the order of the lower byte to the upper byte. When receiving: The receive data is stored to the data storage area in the order of the lower byte to the upper byte.
	Lower Bytes Only	When sending: Each lower byte data in the data storage area is sent. The Ethernet-equipped module ignores the upper byte data. When receiving: The receive data is stored to each lower byte in the data storage area. The Ethernet-equipped module stores 00H in the upper byte.
Byte Swap	Disable (Lower → Upper)/Enable (Upper → Lower)	When sending: When "Enable (Upper → Lower)" is selected, data in the upper byte and lower byte are swapped by one word (2 bytes) and sent. When "Unit of Stored Data" is "Lower Byte + Upper Byte" and "Data Length" is an odd number of bytes, the upper byte is sent at transmission of the last byte. When "Unit of Stored Data" is "Lower Bytes Only" and "Data Length" is an odd number of bytes, data without any byte swap is sent at transmission of the last byte. When receiving: When "Enable (Upper → Lower)" is selected, data in the upper byte and lower byte are swapped by word and sent. When "Unit of Stored Data" is "Lower Byte + Upper Byte" and "Data Length" is an odd number of bytes, the last byte is stored to the upper byte. When "Unit of Stored Data" is "Lower Bytes Only" and "Data Length" is an odd number of bytes, the last byte is stored without any byte swap.

Item	Description
Data Storage Area Specification	Specify the start device for storing the variable value. The settable devices are listed below. Inner user[*1*2] • Input (X) • Output (Y) • Internal relay (M) • Latch relay (L) • Link relay (B) • Data register (D) • Link register (W) File register[*2] • File register (R, ZR) Buffer Memory • G device (G) ('Send/receive area for predefined protocol support function' (Un\G1902000 to Un\G1904047))[*3]

*1 Do not set local devices.
*2 Set within the device range specified with "Device/Label Memory Area Setting" in "Memory/Device Setting" under "CPU Parameters".
*3 This cannot be set if the target module is a CPU module.

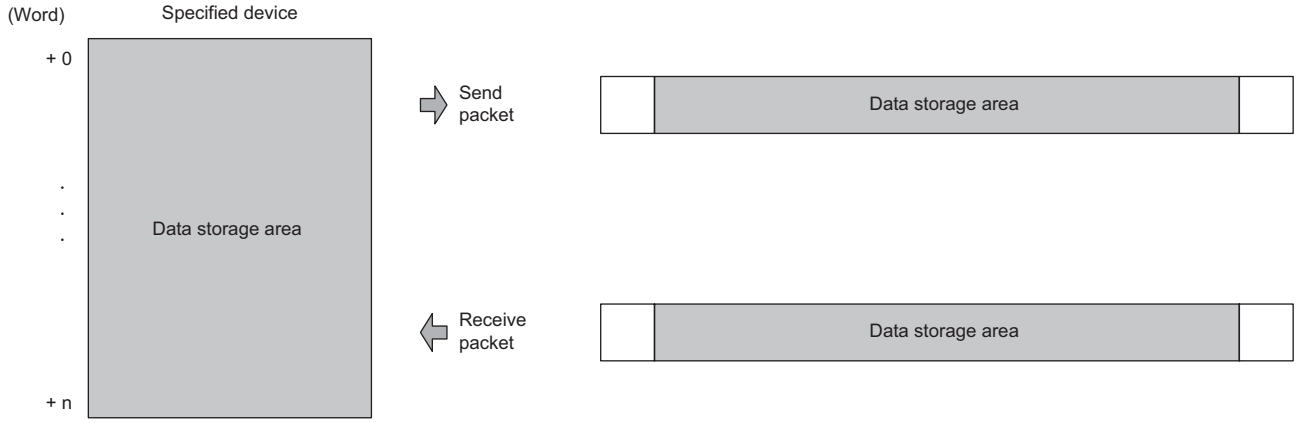
The following figures show the configuration of the data storage area.

■When "Fixed Length/Variable Length" is "Fixed Length"

The area after the device number specified on the "Element Setting" window becomes the data storage area.

The occupied data storage area differs according to the "Unit of Stored Data".

- When "Lower Byte + Upper Byte" is selected, the same size as the data length is occupied. (However, when the data length of a send packet is an odd number, the upper byte (lower byte for "Byte Swap") of the end device is not sent. When the data length of a receive packet is an odd number, the last data is stored with one byte of 00H.)
- When "Lower Bytes Only" is selected, a size double the data length is occupied.



For send packet: Send data is stored by the program

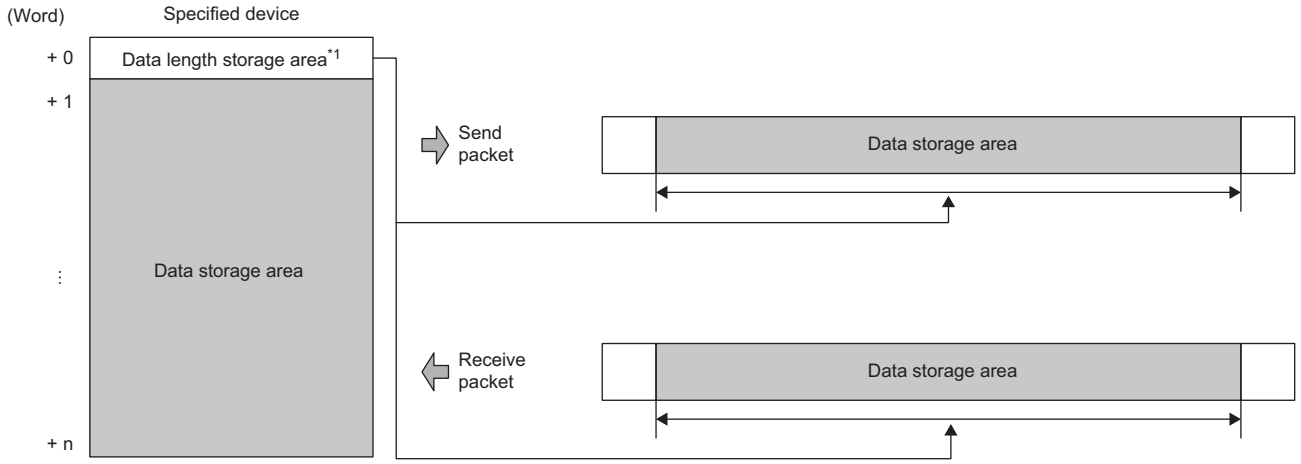
For receive packet: Receive data is stored by the Ethernet-equipped module

■When "Fixed Length/Variable Length" is "Variable Length"

The area after the device number specified on the "Element Setting" window + 1 becomes the data storage area.

The occupied data storage area differs according to the "Unit of Stored Data".

- When "Lower Byte + Upper Byte" is selected, the same size as the data length + one word (length for the data length storage area) are occupied. (However, when the data length of a send packet is an odd number, the upper byte (lower byte for "Byte Swap") of the end device is not sent. When the data length of a receive packet is an odd number, the last data is stored with one byte of 00H.)
- When "Lower Bytes Only" is selected, a size double the data length + one word (for data length storage area) is occupied.



For send packet: Send data is stored by the program

For receive packet: Receive data is stored by the Ethernet-equipped module

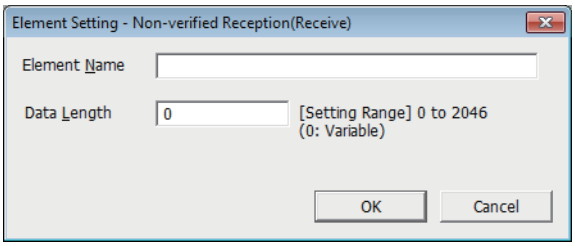
*1 The data length unit is byte fixed

Point

When "Fixed Length/Variable Length" is "Variable Length" and the configuration is set as follows, an error occurs:

- An element other than static data is placed behind a non-conversion variable element when non-conversion variable is out of the length calculating range or when there is no length element (except for when non-conversion variable is placed at the end of the packet elements).
- Multiple non-conversion variable elements are placed in the length calculating range, while a length element is not placed.
- A non-conversion variable element is placed before a length element in the length calculating range.

Non-verified reception



Use this when receive data include unnecessary data.
If the receive packet contains non-verified reception, Ethernet-equipped module skims over the specified number of characters.
Multiple non-verified reception elements can be set in one packet.
The following table lists the items.

Item	Description		Remarks
Element Name	Set the element name.		—
Data Length	0 (Number of characters variable)	Set when the number of characters that are not verified differs between each communication session.	—
	1 to 2046 (number of character specification)	Set the number of characters that are not verified.	

Point

When "Data Length" is set to 0, an error will occur if the following layout is used.

- An element other than static data is placed behind a non-verified reception element when non-verified reception is out of the length calculating range or when there is no length element (except for when non-verified reception is placed at the end of the packet elements).
- Multiple non-verified reception elements are placed in the length calculating range, while a length element is not placed.
- A non-verified reception element is placed before a length element in the length calculating range.

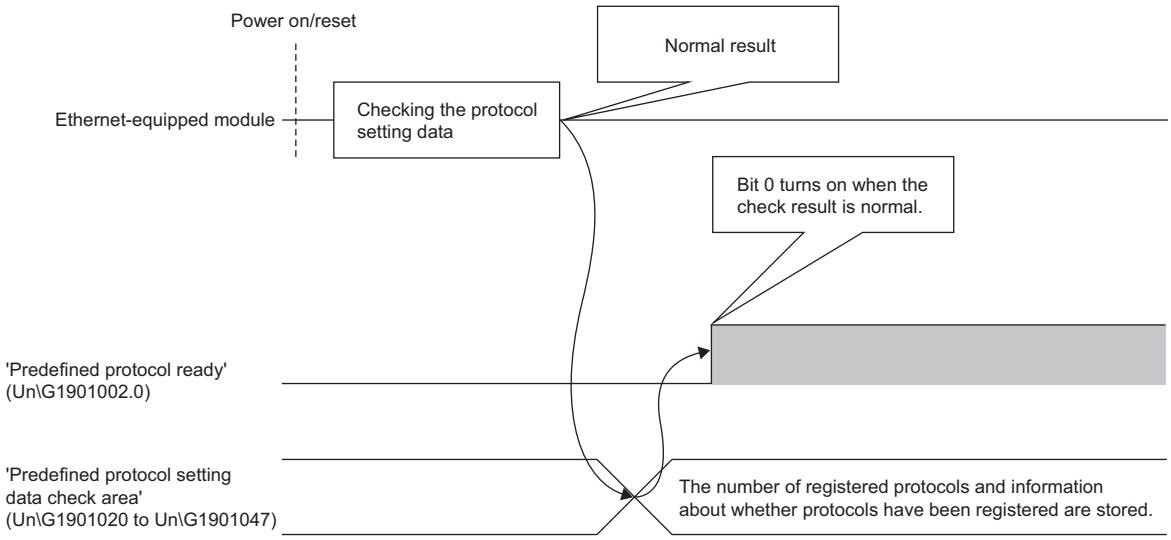
Execution conditions of predefined protocol communications

The predefined protocol communications can be executed when 'Predefined protocol ready' (Un\G1901002.0) is on.
This section describes the operation of 'Predefined protocol ready' (Un\G1901002.0).

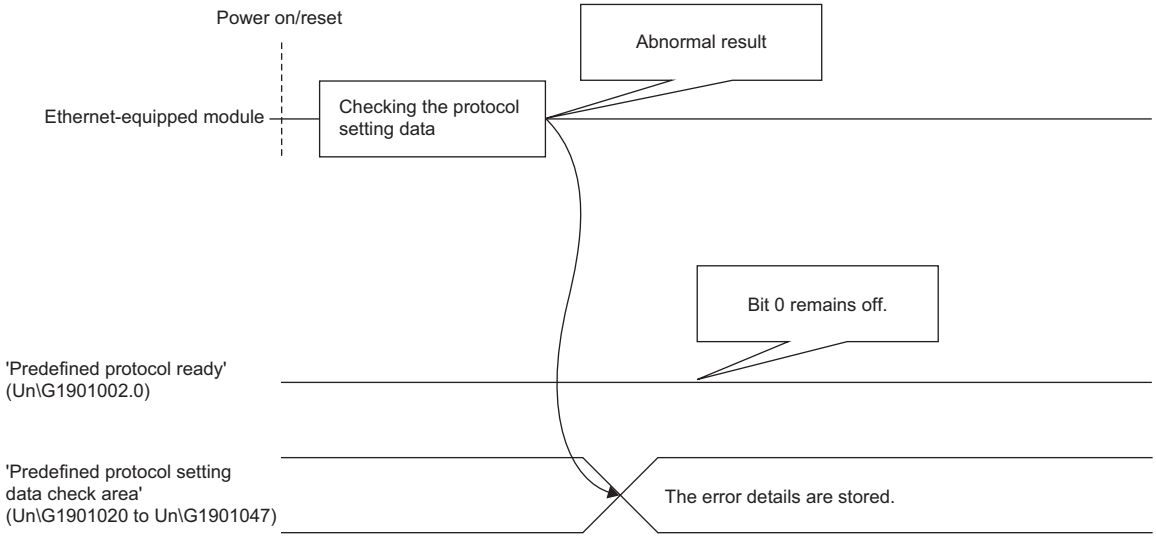
When the system is powered on or reset

If protocol setting data is written in, the Ethernet-equipped module checks the protocol setting data when the system is powered on or reset.
If the protocol setting data is normal, the Ethernet-equipped module turns on 'Predefined protocol ready' (Un\G1901002.0), and enables execution of the protocol.
'Predefined protocol ready' (Un\G1901002.0) is used as the interlock signal for executing the protocol.
If the protocol setting data is abnormal, 'Predefined protocol ready' (Un\G1901002.0) stays off, and the details of the error are stored in 'Predefined protocol setting data check area' (Un\G1901020 to Un\G1901047).
If protocol setting data is not written in, the protocol setting data is not checked, and 'Predefined protocol ready' (Un\G1901002.0) remains off.
Whether the protocol setting data is registered or not can be checked with 'Number of registered predefined protocols' (Un\G1901024) and 'Predefined protocol registration' (Un\G1091032 to Un\G1901047).

■When protocol setting data is normal


Power on/reset
Normal result
Ethernet-equipped module
Checking the protocol setting data
Bit 0 turns on when the check result is normal.
'Predefined protocol ready' (Un\G1901002.0)
'Predefined protocol setting data check area' (Un\G1901020 to Un\G1901047)
The number of registered protocols and information about whether protocols have been registered are stored.

■When protocol setting data is abnormal


Power on/reset
Abnormal result
Ethernet-equipped module
Checking the protocol setting data
Bit 0 remains off.
'Predefined protocol ready' (Un\G1901002.0)
'Predefined protocol setting data check area' (Un\G1901020 to Un\G1901047)
The error details are stored.

When executing UINI instruction

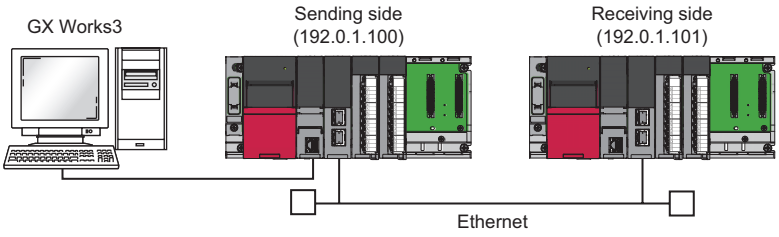
When the RJ71EN71 network type is set to "Q Compatible Ethernet" and the UINI instruction is executed, the protocol setting data will not be checked.

Predefined protocol ready maintains the state before the UINI instruction was executed.

Example of predefined protocol communications

This section describes an example of predefined protocol communications using UCP/IP.

System configuration



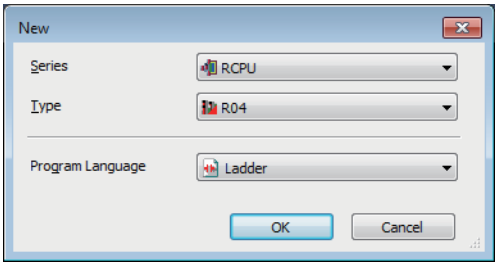
Parameter settings

Connect the engineering tool to the CPU module and set the parameters.

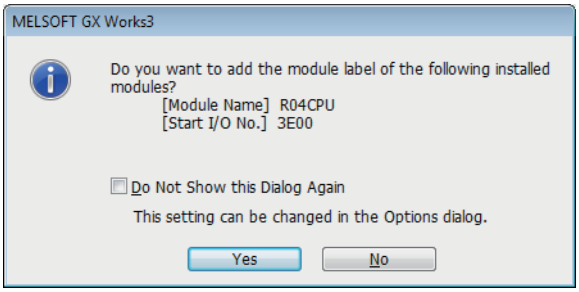
■Sending side

1. Set the CPU module in the following item.

[Project] ⇨ [New]

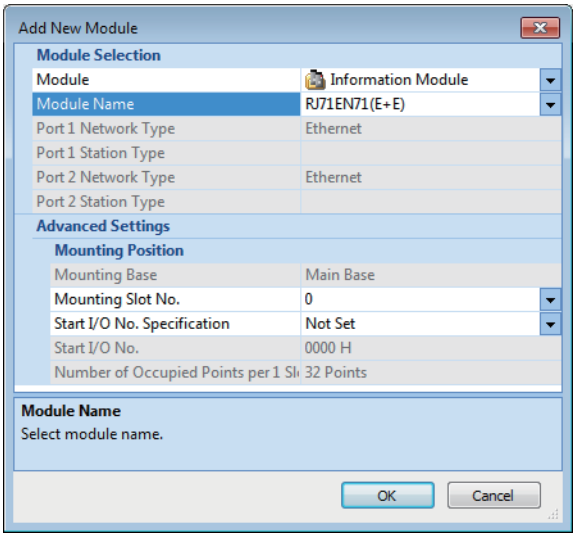


2. Click the [Yes] button to add the module labels of the CPU module.

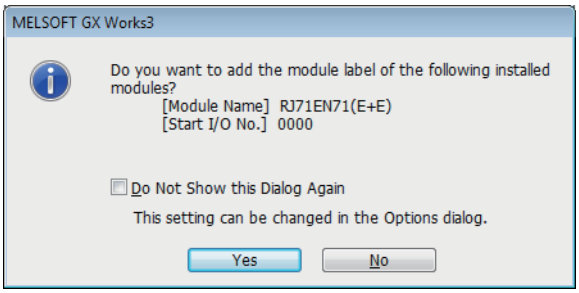

MELSOFT GX Works3
Do you want to add the module label of the following installed modules?
[Module Name] R04CPU
[Start I/O No.] 3E00
Do Not Show this Dialog Again
This setting can be changed in the Options dialog.
Yes
No

3. Set the RJ71EN71 in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]

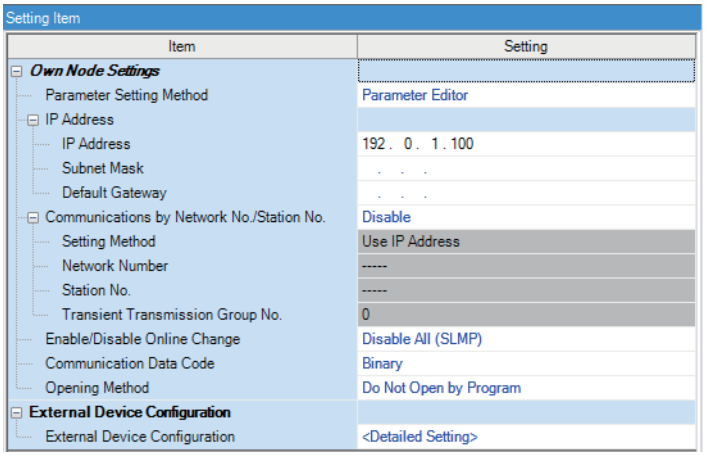


4. Click the [Yes] button to add a module label of the RJ71EN71.


MELSOFT GX Works3
Do you want to add the module label of the following installed modules?
[Module Name] RJ71EN71(E+E)
[Start I/O No.] 0000
Do Not Show this Dialog Again
This setting can be changed in the Options dialog.
Yes
No

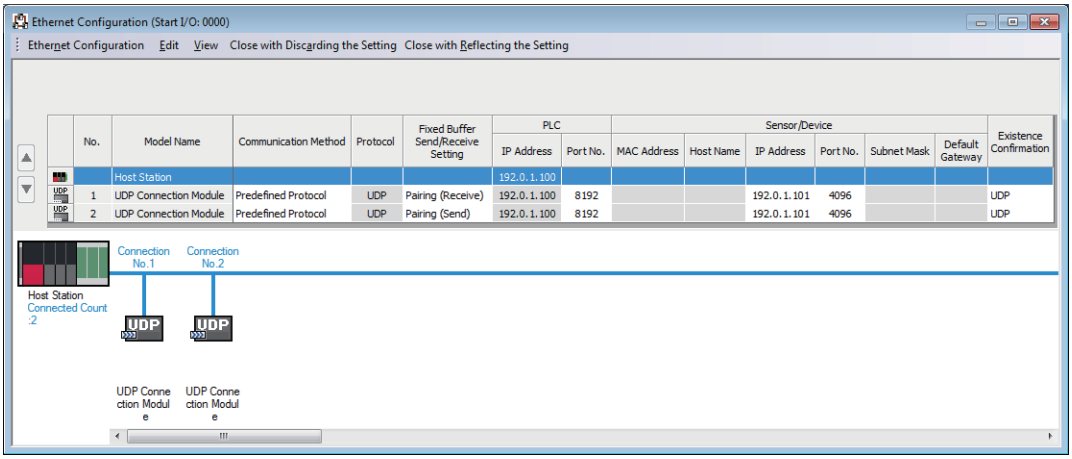
5. Set the "Basic Settings" in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings]



6. Set the network configuration in the following item.

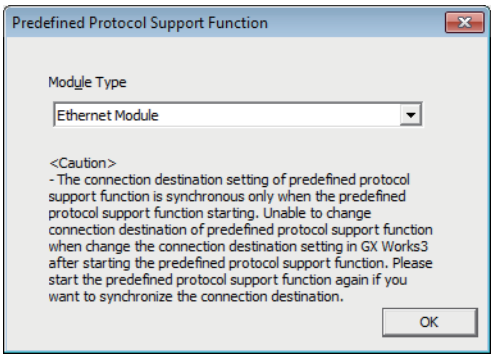
Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings] ⇨ [External Device Configuration]



7. Start the predefined protocol support function.

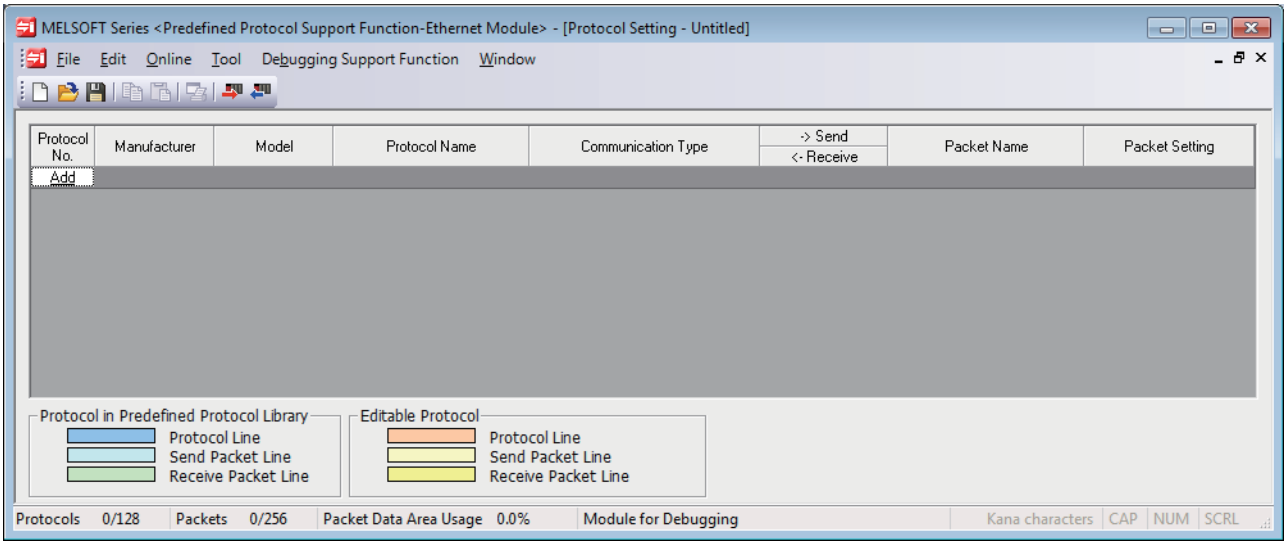
[Tool] ⇨ [Predefined Protocol Support Function]

8. Select "Ethernet Module" for "Module Type" and click the [OK] button.


Predefined Protocol Support Function
Module Type
Ethernet Module
<Caution>
- The connection destination setting of predefined protocol support function is synchronous only when the predefined protocol support function starting. Unable to change connection destination of predefined protocol support function when change the connection destination setting in GX Works3 after starting the predefined protocol support function. Please start the predefined protocol support function again if you want to synchronize the connection destination.
OK

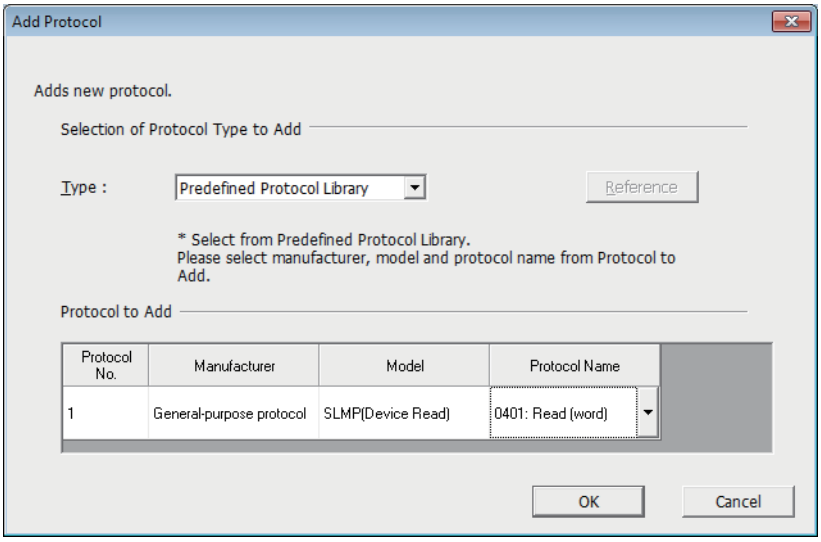
9. Newly create the protocol setting.

[File] ⇨ [New]



10. Set a protocol in the following item.

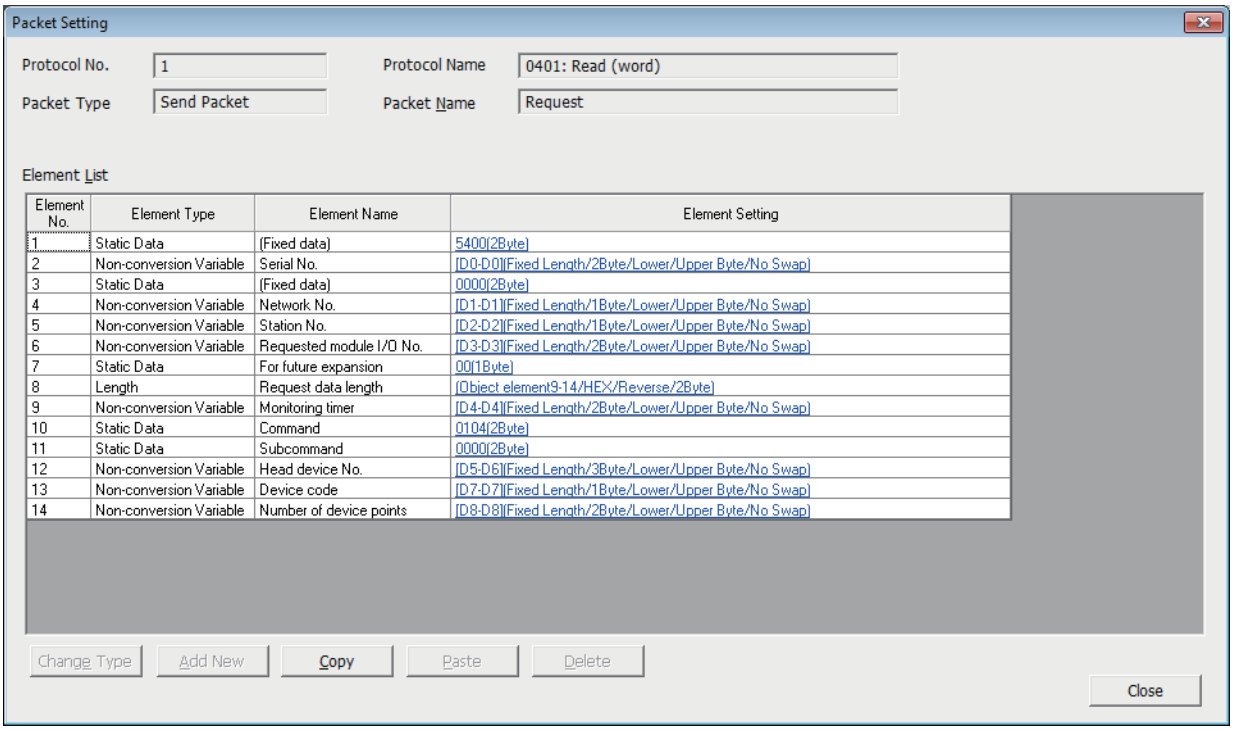
[Edit] ⇨ [Add Protocol]



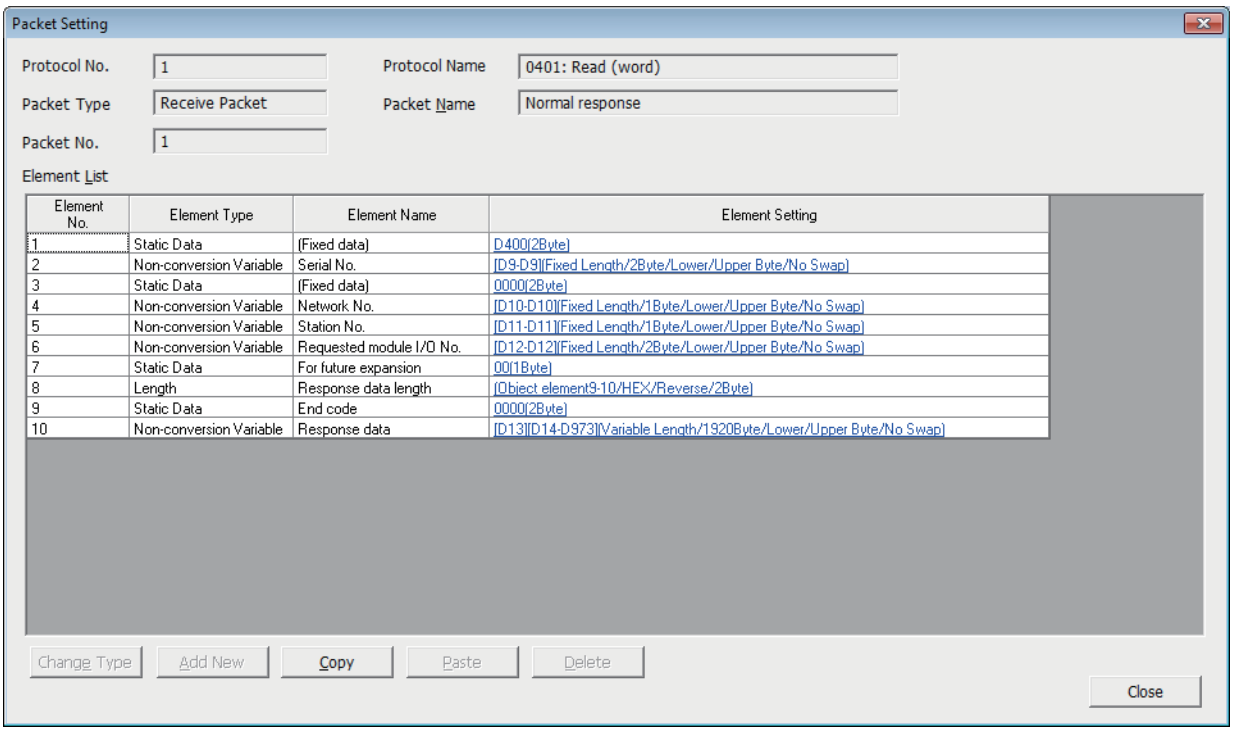
11. Set each packet in the following item.

"Protocol Setting" window ⇨ Packet to be set

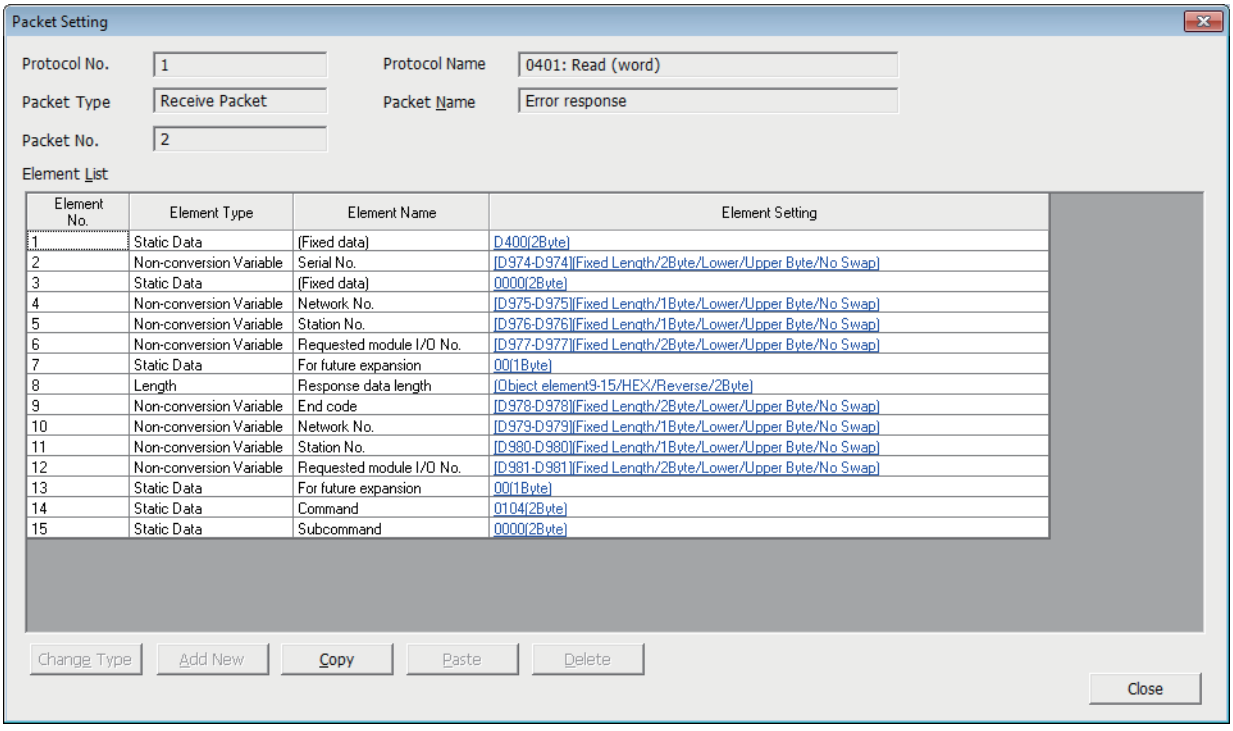
- Request


Packet Setting
Protocol No.
1
Protocol Name
0401: Read (word)
Packet Type
Send Packet
Packet Name
Request
Element List
Element No.
Element Type
Element Name
Element Setting
1 Static Data (Fixed data) 5400(2Byte)
2 Non-conversion Variable Serial No. [D0-D0][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
3 Static Data (Fixed data) 0000(2Byte)
4 Non-conversion Variable Network No. [D1-D1][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
5 Non-conversion Variable Station No. [D2-D2][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
6 Non-conversion Variable Requested module I/O No. [D3-D3][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
7 Static Data For future expansion 00(1Byte)
8 Length Request data length [Object element9-14/HEX/Reverse/2Byte]
9 Non-conversion Variable Monitoring timer [D4-D4][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
10 Static Data Command 0104(2Byte)
11 Static Data Subcommand 0000(2Byte)
12 Non-conversion Variable Head device No. [D5-D6][Fixed Length/3Byte/Lower/Upper Byte/No Swap]
13 Non-conversion Variable Device code [D7-D7][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
14 Non-conversion Variable Number of device points [D8-D8][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
Change Type
Add New
Copy
Paste
Delete
Close

• Normal response

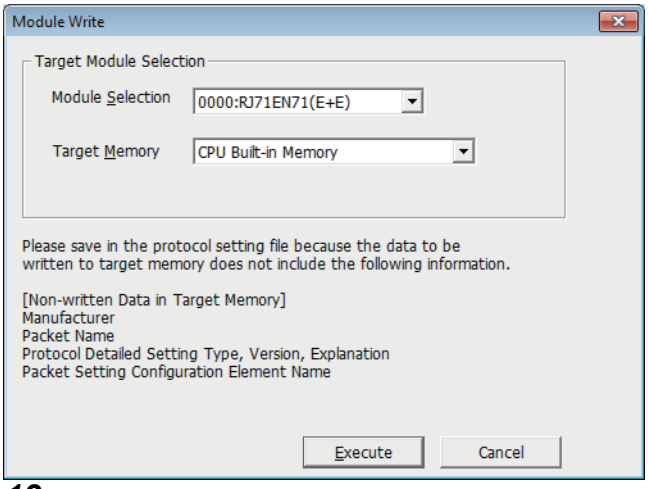

Packet Setting
Protocol No. 1
Protocol Name 0401: Read (word)
Packet Type Receive Packet
Packet Name Normal response
Packet No. 1
Element List
Element No. | Element Type | Element Name | Element Setting
1 | Static Data | (Fixed data) | D400(2Byte)
2 | Non-conversion Variable | Serial No. | [D9-D9][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
3 | Static Data | (Fixed data) | 0000(2Byte)
4 | Non-conversion Variable | Network No. | [D10-D10][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
5 | Non-conversion Variable | Station No. | [D11-D11][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
6 | Non-conversion Variable | Requested module I/O No. | [D12-D12][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
7 | Static Data | For future expansion | 00(1Byte)
8 | Length | Response data length | [Object element9-10/HEX/Reverse/2Byte]
9 | Static Data | End code | 0000(2Byte)
10 | Non-conversion Variable | Response data | [D13][D14-D973][Variable Length/1920Byte/Lower/Upper Byte/No Swap]
Change Type
Add New
Copy
Paste
Delete
Close

• Error response


Packet Setting
Protocol No. 1
Protocol Name 0401: Read (word)
Packet Type Receive Packet
Packet Name Error response
Packet No. 2
Element List
Element No. | Element Type | Element Name | Element Setting
1 | Static Data | (Fixed data) | D400(2Byte)
2 | Non-conversion Variable | Serial No. | [D974-D974][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
3 | Static Data | (Fixed data) | 0000(2Byte)
4 | Non-conversion Variable | Network No. | [D975-D975][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
5 | Non-conversion Variable | Station No. | [D976-D976][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
6 | Non-conversion Variable | Requested module I/O No. | [D977-D977][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
7 | Static Data | For future expansion | 00(1Byte)
8 | Length | Response data length | [Object element9-15/HEX/Reverse/2Byte]
9 | Non-conversion Variable | End code | [D978-D978][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
10 | Non-conversion Variable | Network No. | [D979-D979][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
11 | Non-conversion Variable | Station No. | [D980-D980][Fixed Length/1Byte/Lower/Upper Byte/No Swap]
12 | Non-conversion Variable | Requested module I/O No. | [D981-D981][Fixed Length/2Byte/Lower/Upper Byte/No Swap]
13 | Static Data | For future expansion | 00(1Byte)
14 | Static Data | Command | 0104(2Byte)
15 | Static Data | Subcommand | 0000(2Byte)
Change Type
Add New
Copy
Paste
Delete
Close

12. Write the protocol setting data to the CPU module.

[Online] ⇨ [Write to Module]


Module Write
Target Module Selection
Module Selection
0000:RJ71EN71(E+E)
Target Memory
CPU Built-in Memory
Please save in the protocol setting file because the data to be written to target memory does not include the following information.
[Non-written Data in Target Memory]
Manufacturer
Packet Name
Protocol Detailed Setting Type, Version, Explanation
Packet Setting Configuration Element Name
Execute
Cancel

13. Write the set parameters to the CPU module. Then reset the CPU module or power off and on the system.

[Online] ⇨ [Write to PLC]

Point

In this example, default values were used for parameters that are not shown above. For the parameter setting, refer to the chapter explaining the parameters in this manual. (☞ Page 124 PARAMETER SETTINGS)

■Receiving side

1. Set the CPU module and add the module labels of the CPU module. The setting method of the CPU module and addition method of the module label are the same as those of when setting the sending side. (☞ Page 43 Sending side)

2. Set the RJ71EN71 and add the module labels of the RJ71EN71. The setting method of the RJ71EN71 and addition method of the module label are the same as those of when setting the sending side. (☞ Page 43 Sending side)

3. Set the "Basic Settings" in the following item.

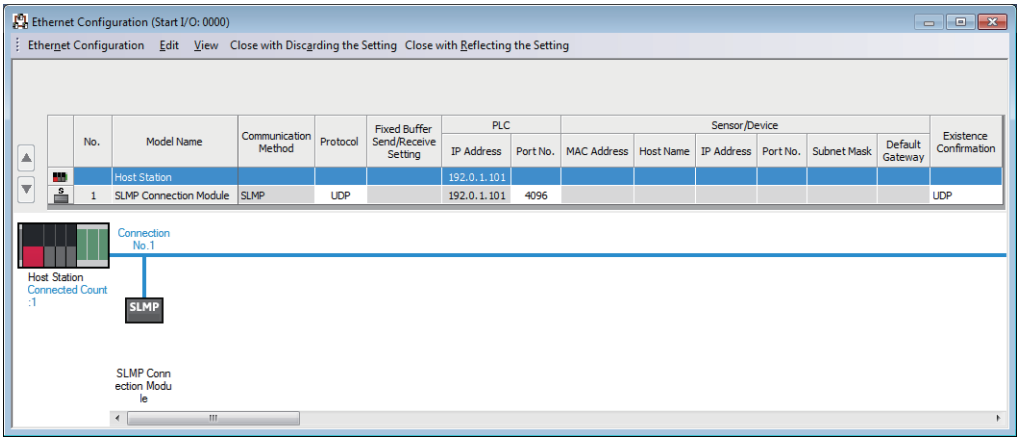
Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings]

Setting Item

Item	Setting
Own Node Settings	
Parameter Setting Method	Parameter Editor
IP Address	
IP Address	192 . 0 . 1 . 101
Subnet Mask	. . .
Default Gateway	. . .
Communications by Network No./Station No.	Disable
Setting Method	Use IP Address
Network Number	-----
Station No.	-----
Transient Transmission Group No.	0
Enable/Disable Online Change	Disable All (SLMP)
Communication Data Code	Binary
Opening Method	Do Not Open by Program
External Device Configuration	
External Device Configuration	<Detailed Setting>

4. Set the network configuration in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings] ⇨ [External Device Configuration]



5. Write the set parameters to the CPU module. Then reset the CPU module or power off and on the system.

[Online] ⇨ [Write to PLC]

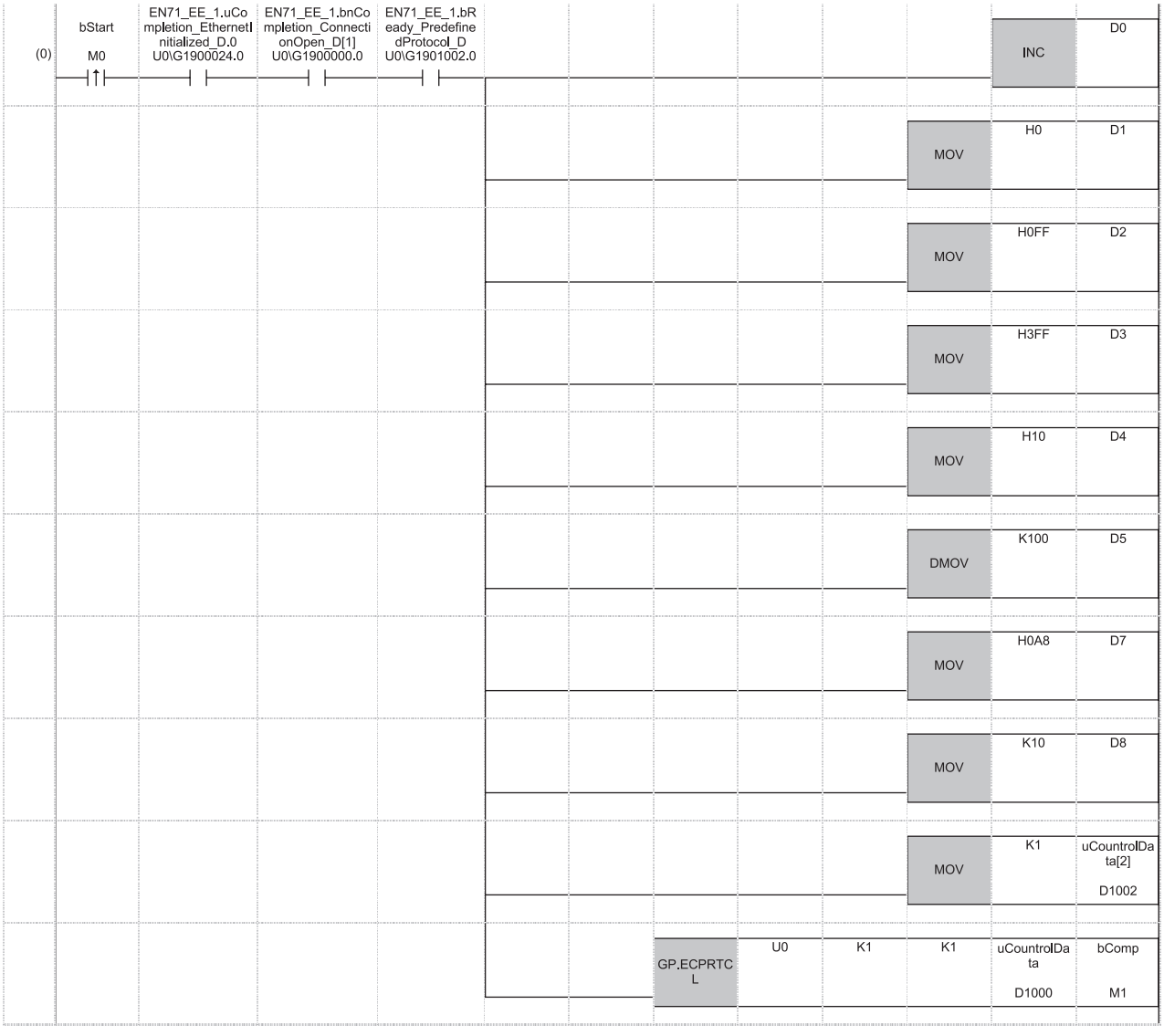
Point

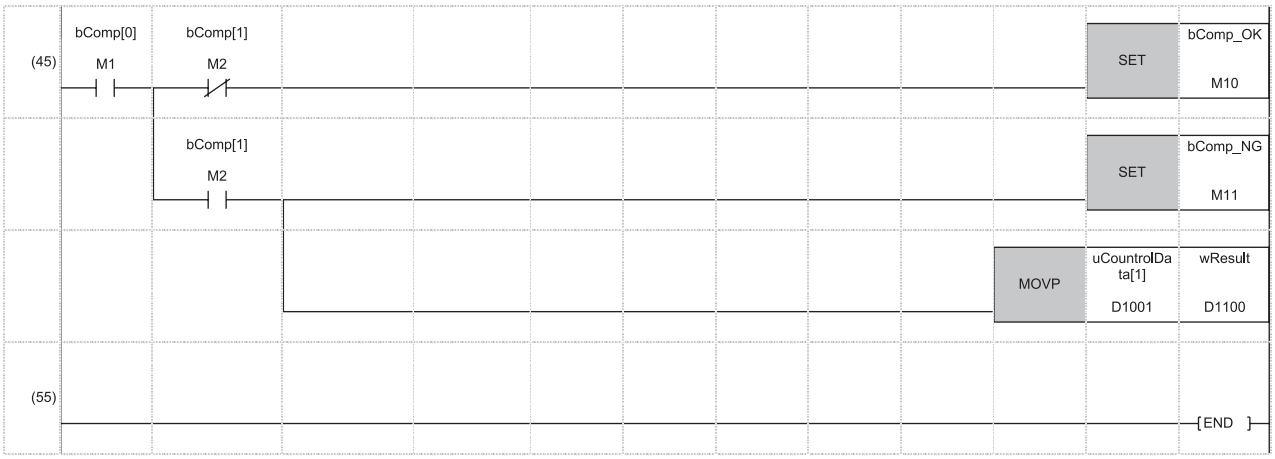
In this example, default values were used for parameters that are not shown above. For the parameter setting, refer to the chapter explaining the parameters in this manual. (☞ Page 124 PARAMETER SETTINGS)

Program examples

Classification	Label name	Description	Device
Module label	EN71_EE_1.bnCompletion_ConnectionOpen[1]	Open completion signal (connection No.1)	U0\G1900000.0
	EN71_EE_1.uCompletion_EthernetInitialized_D.0	Initial status	U0\G1900024.0
	EN71_EE_1.bReady_PredefinedProtocol_D	Predefined protocol ready	U0\G1901002.0
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
bStart	Bit	...	VAR_GLOBAL	M0
bComp	Bit(0..1)	...	VAR_GLOBAL	M1
bComp_OK	Bit	...	VAR_GLOBAL	M10
bComp_NG	Bit	...	VAR_GLOBAL	M11
uCountrolData	Word [Unsigned]/Bit String [16-bit](0..17)	...	VAR_GLOBAL	D1000
wResult	Word [Signed]	...	VAR_GLOBAL	D1100





(0) When 'bStart' (M0) is turned on, the protocol is executed by the GP.ECPRTCL instruction and D100 to D109 of the receiving side CPU module is read and stored in D14 to D23 of the sending side CPU module.
'bComp_OK' (M10) is turned on when the protocol completed successfully.

D0 to D8 stores the following as a protocol setting data.

Device number	Element name	Setting value	Description
D0	Serial No.	—	The number increases one by one each time the 'bStart' (M0) is turned on.
D1	Network No.	0H	Because the access destination is the connected station (own station), 0H is stored as the request destination network number.
D2	Station No.	FFH	Because the access destination is the connected station (own station), FFH is stored as the request destination station number.
D3	Requested module I/O No.	3FFH	Because the access destination is the receiving side CPU module (control CPU of the receiving side RJ71EN71), 3FFH is stored.
D4	Monitoring timer	10H	The monitoring timer is set to 4 seconds. (Unit: 250ms)
D5 to D6	Head device No.	100	To read D100 to D109, start device number is set to 100.
D7	Device code	A8H	To read D100 to D109, device code is set to A8H.
D8	Number of device points	10	To read 10 points from D100 to D109, number of device points is set to 10.

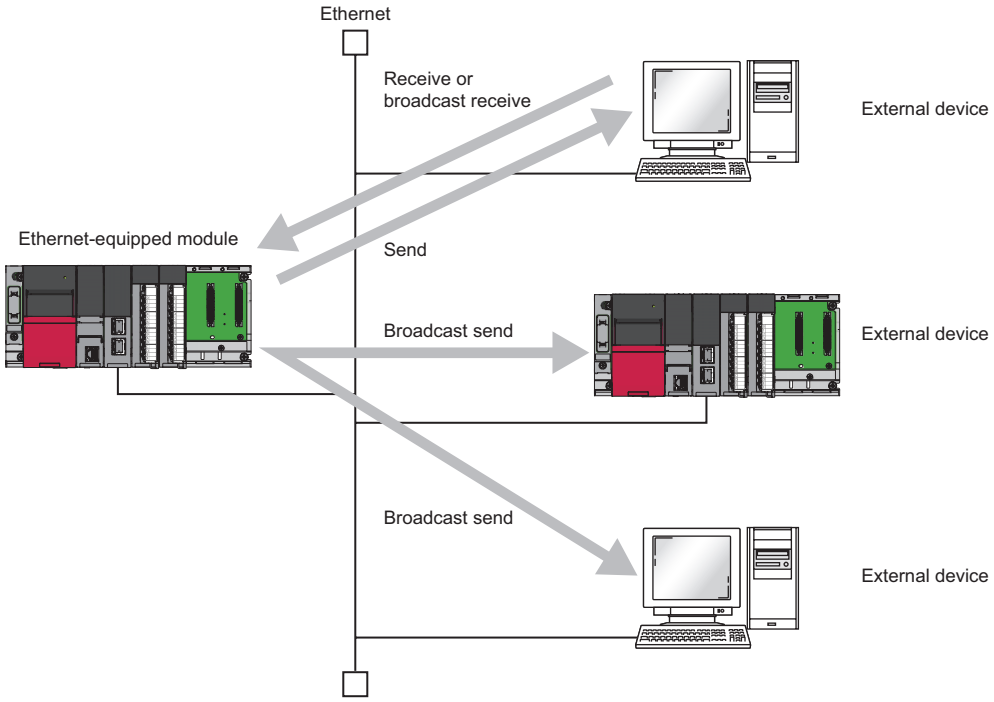
Point

In this program example, a receiving side program is not required.

1.4 Socket Communications

Using dedicated instructions, arbitrary data can be exchanged with an external device connected by Ethernet over TCP/IP or UDP/IP.

Use this for bidirectional communication one-on-one with an external device.



Point

For examples of socket communications, refer to the following.

MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)

Restriction

Socket communications cannot be used when the RJ71EN71 network type is set to "Q Compatible Ethernet".

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select the external device to be connected in "Module List" and drag it to "List of devices" or "Device map area".

External device name	Description
UDP Connection Module	Select to communicate with the external device using UDP/IP
Active Connection Module	Select to perform the open processing to the external device from the Ethernet-equipped module (Active open) and communicate using TCP/IP.
Unpassive Connection Module	Select to receive the open processing from a unspecified external device (Unpassive open) and communicate using TCP/IP.
Fullpassive Connection Module	Select to receive the open processing from the specified external device (Fullpassive open) and communicate using TCP/IP.

2. Set "Communication Method" for the external device to "Socket Communication".

3. Set the other parameters required for communication in the connection.

Applicable dedicated instructions

The following table lists the dedicated instructions for exchanging data with socket communications.
For details on dedicated instructions, refer to the following.
MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

List of dedicated instructions

The following table lists the dedicated instructions used by each module.

■Instructions used by the RJ71EN71

Instruction	Description
GP.CONOPEN	Establishes a connection.
GP.CONCLOSE	Closes the connection.
GP.SOCRCV	Reads the receive data from the external device.
G.SOCRCVS	
GP.SOCSND	Sends data to the external device.

■Instructions used by the CPU module

Instruction	Description
SP.SOCOPEN	Establishes a connection.
SP.SOCCLOSE	Closes the connection.
SP.SOCRCV	Reads the receive data from the external device.
G.SOCRCVS	
S.SOCRCVS	
GP.SOCSND	Sends data to the external device.
SP.SOCSND	
SP.SOCCINF	Reads connection information
SP.SOCCSET	Changes the communication target
SP.SOCRMODE	Changes the connection receive mode.
S(P).SOCRDATA	Reads the specified size of data from the socket communications receive data area.

Point

If the instruction has a completion device, do not change the various data (such as control data and request data) specified with the executed instruction until execution of the instruction is completed.

Applicable connections

The following connections can be used for data exchange with socket communications.

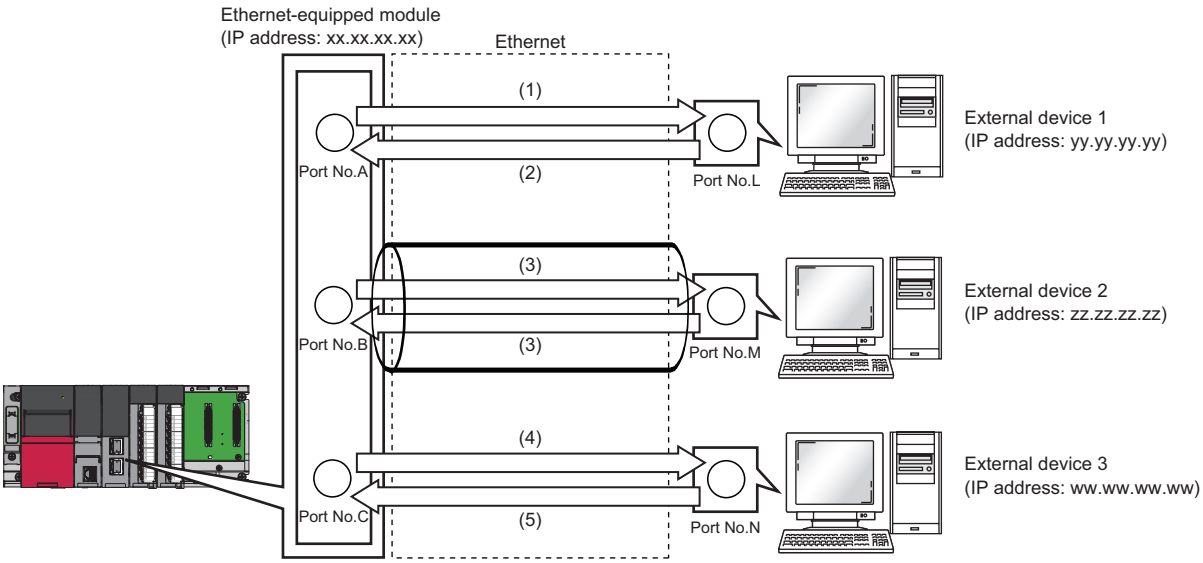
Module		Usable connections
RJ71EN71	P1 connector	Connection No.17 to 64
	P2 connector	Connection No.1 to 64
CPU module		Connection No.1 to 16

Communication structure

With socket communications, port numbers that identify the communication are used to enable multiple communication sessions with the external device. These are used for both TCP/IP and UDP/IP.

For send: Specify send source Ethernet-equipped module's port number and the send destination external device's port number.

For receive: Specify the Ethernet-equipped module's port number, and read the data sent to that port.



(1) Sending UDP data from Ethernet-equipped module's port number A to external device 1's port number L.
(2) Sending UDP data from external device 1's port number L to Ethernet-equipped module's port number A
(3) Sending data with TCP/IP connection
(4) Sending UDP data from Ethernet-equipped module's port number C to external device 3's port number N
(5) Sending DUP data from external device 3's port number N to Ethernet-equipped module's port number C

Communications using TCP/IP

TCP/IP protocol establishes a connection between the external device's port number for reliable data exchange.
Check the following items before performing socket communications using TCP/IP.

- IP addresses and port numbers on external device side
- IP addresses and port numbers on the Ethernet-equipped module side
- Which side, the external device side or Ethernet-equipped module side, will open a connection (Active open or Passive open)

TCP/IP connection operation

TCP/IP connection includes Active open and Passive open.
First, the side with the TCP/IP connection executes Passive open with the specified port number
The side with TCP/IP connection specifies the port number waiting in the Passive open side, and executes Active open.
This enables the TCP/IP connection, the connection is established, and data can be exchanged.
For details on Active open and Passive open, refer to the following.
(☞ Page 219 TCP/IP communications)

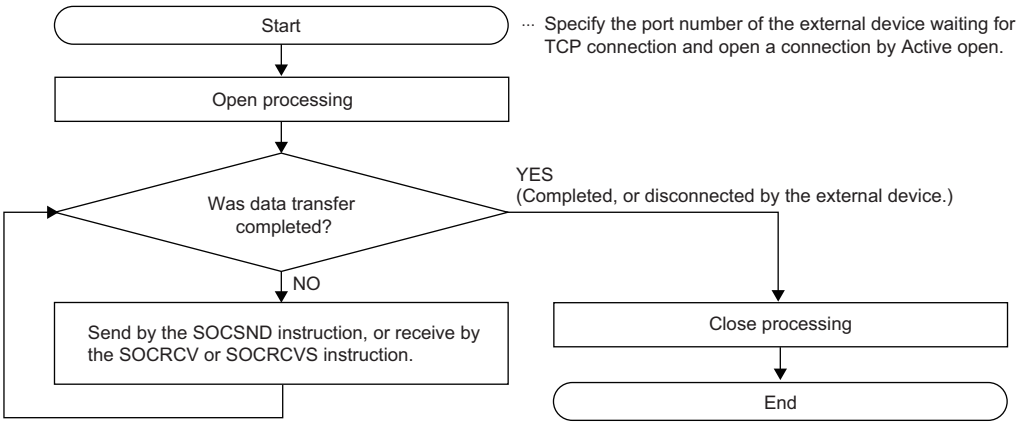
Point

The Active open and Passive open expression may differ according to the external device.

- Active open: TCP/IP connection side, client side, connect side, and others
- Passive open: TCP/IP connection wait side, server side, listen side, and others

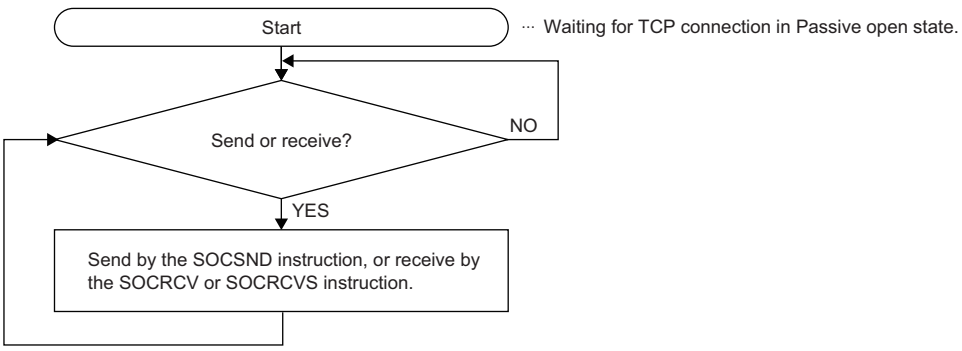
■Active open

The following figure shows the flow of data exchange using Active open.


Start
··· Specify the port number of the external device waiting for TCP connection and open a connection by Active open.
Open processing
Was data transfer completed?
YES
(Completed, or disconnected by the external device.)
NO
Send by the SOCSND instruction, or receive by the SOCRCV or SOCRCVS instruction.
Close processing
End

■Passive open

The following figure shows the flow of data exchange using Passive open.


Start
··· Waiting for TCP connection in Passive open state.
Send or receive?
NO
YES
Send by the SOCSND instruction, or receive by the SOCRCV or SOCRCVS instruction.

Precautions for TCP/IP communications

■Conditions for closing

In addition to when close is requested from the external device, the TCP/IP communications processing will be closed in the following cases if 'Open completion signal' (Un\G1900000 to Un\G1900007) turns off.

- When alive check function times out
- When forced close is received from external device

■TCP/IP connection elements

The TCP/IP connection is managed with the following four elements. Only one connection containing the same four elements can be created at one time. To use multiple TCP/IP connections simultaneously, ensure that one of the four elements is different.

- IP address of the Ethernet-equipped module side
- Port number of the Ethernet-equipped module side
- IP address of the external device side
- Port number of the external device side

■Reconnecting with same connection

After closing the connection during TCP/IP communications, wait at least 500ms before reconnecting to a connection with the same external device (IP address), own station port number, and external device port number.

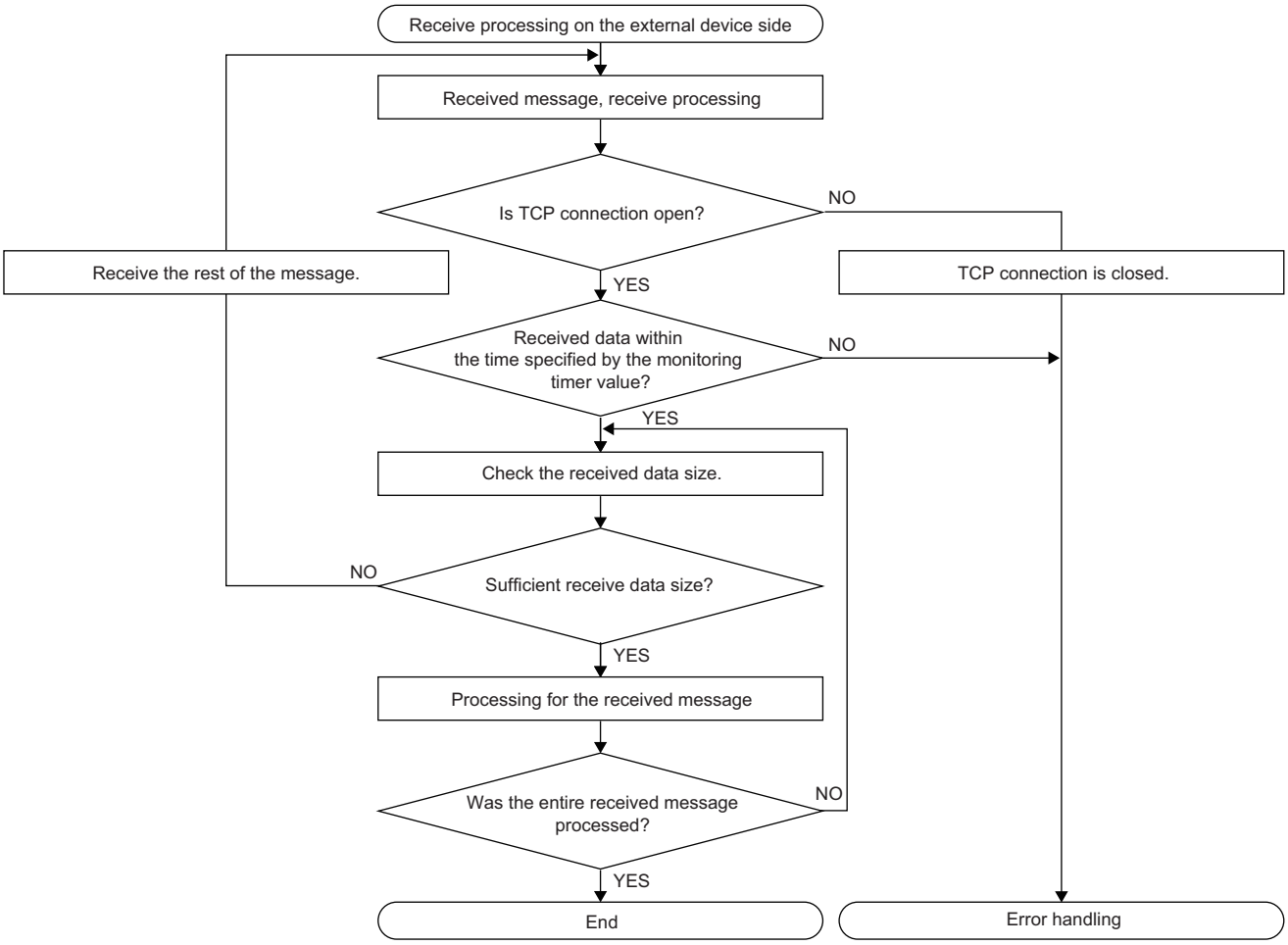
If a wait interval cannot be provided before reconnecting, changing the own station port number on the Active open side and connecting is recommended.

■Checking the receive data length

There is no concept of delimiting the exchanged data during communication with TCP/IP. Thus, the continuously sent data may be merged on the received side, or the data sent in a group may be split on the receive side. If necessary, the receiving side must check the receive data length and perform the processing.

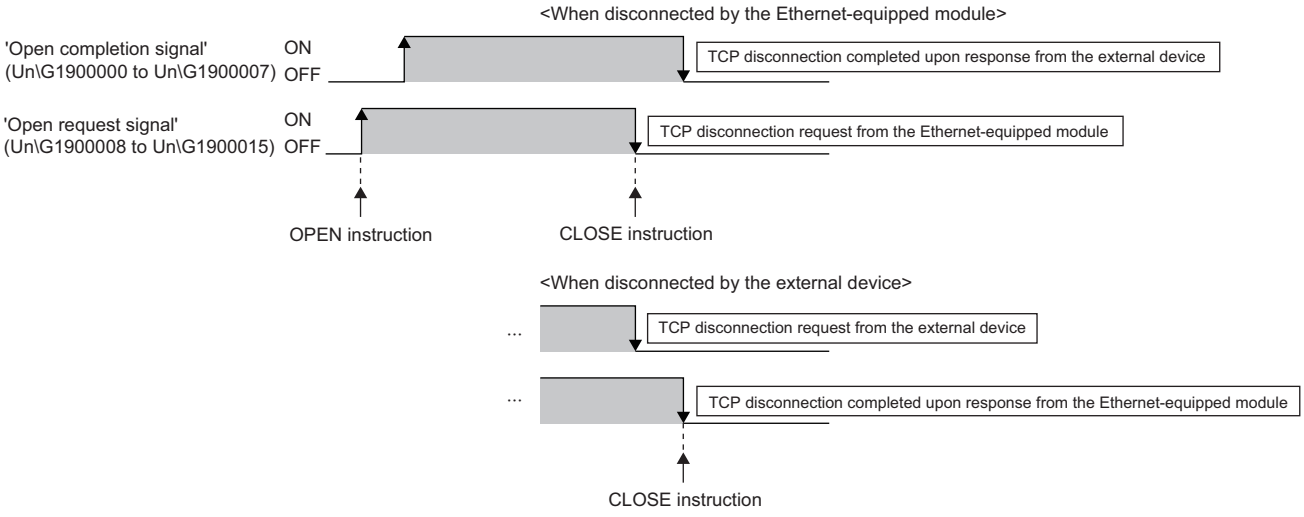
If the data length is determined when receiving with the Ethernet-equipped module side, using the fixed-length mode is recommended.

When receiving on the external device side, check the receive data length and perform the processing as shown below.



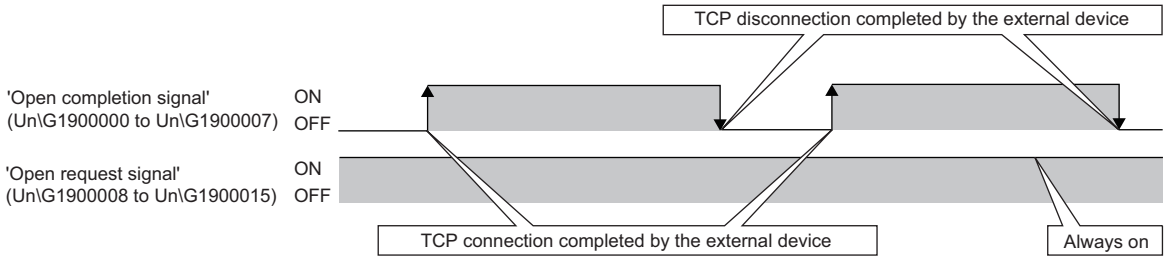
■Precautions for Active open

Use 'Open completion signal' (Un\G1900000 to Un\G1900007) and 'Open request signal' (Un\G1900008 to Un\G1900015) in the program to create an interlock circuit. The on/off timing for the open completion signal and open request signal is shown below.



■Precautions for Passive open

- Use 'Open completion signal' (Un\G1900000 to Un\G1900007) and 'Open request signal' (Un\G1900008 to Un\G1900015) in the program to create an interlock circuit. The on/off timing for the open completion signal and open request signal is shown below.



- When the CPU module is connected to the external device with Passive open, the connected external device's IP address or the external device's port number can be retrieved with the SP.SOCCINF instruction.
- With TCP/IP, one external device is connected to with one connection. To connect with multiple external devices with the same own station port number, provide a connection for each external device. If more external devices than the prepared number of connections are connected, the connection will be disconnected immediately.
- Connect from the external device after the Ethernet-equipped module enters the open standby state. The TCP/IP connection request received from the external device between the time from CPU startup completion to open wait state causes an error, and force close connection is returned to the external device. In this case, wait for the Ethernet-equipped module to enter the open wait state and then retry from the external device.
- Do not execute the GP.CONCLOSE instruction or SP.SOCCLOSE instruction in the program. If the GP.CONCLOSE instruction or SP.SOCCLOSE instruction is executed, the open completion signal and open request signal for the corresponding connection will turn off. The close processing will be executed and send/receive will be disabled. To re-open a closed connection, execute the GP.CONOPEN instruction or SP.SOCOPN instruction.

Communications using UDP/IP

Communication with UDP/IP uses a simple protocol without order control or re-send control.
Check the following items before performing socket communications using UDP/IP.

- IP addresses and port numbers on external device side
- IP addresses and port numbers on the Ethernet-equipped module side

Precautions for UDP/IP communications

- Loss of data, data arrival order interchange, and others could be occur. Consider using TCP/IP if there are problems.
- Even if the communication line between the CPU module and external device is not connected because of a connected cable disconnection and others, the data send processing may end normally. Thus, providing a communication procedure and sending/receiving data is recommended.
- Use the SP.SOCCSET instruction to change the external device with the CPU module.
- 'Open completion signal' (Un\G1900000 to Un\G1900007) and 'Open request signal' (Un\G1900008 to Un\G1900015) for the connection set to UDP/IP is always on.
- Do not execute the GP.CONCLOSE instruction or SP.SOCCLOSE instruction in the program. If the GP.CONCLOSE instruction or SP.SOCCLOSE instruction is executed, the open completion signal and open request signal for the corresponding connection will turn off. The close processing will be executed and send/receive will be disabled. To re-open a closed connection, execute the GP.CONOPEN instruction or SP.SOCOPN instruction.

Broadcast communications

Broadcast communications is a communication method that does not specify the external device. Data is exchanged between all Ethernet-equipped module stations and external devices on the same Ethernet to which the Ethernet-equipped modules are connected.

Item	Description
Broadcast sending	The same data is sent to all Ethernet devices on the same Ethernet.
Broadcast receiving	The data sent with broadcast send is received.

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select "UDP Connection Module" in "Module List" and drag it to "List of devices" or "Device map area".
2. Set "Communication Method" for the external device to "Broadcast Send" or "Broadcast Receive".
3. Set the other parameters required for communication in the connection.

Point

Access via a router is not permitted when using broadcast send.

Precautions for broadcast communication

- Decide the dedicated port number for broadcast communication in the system, and use that number.
- Access via a router is not permitted when using broadcast send.
- The external device connected on the same Ethernet must carry out a read/discard processing if the message received with broadcast receiving is not required.
- When the CPU module receives the data with broadcast receiving, the IP address of the sending external device and the external device's port number can be retried with the SP.SOCCINF instruction.

Precautions

This section describes the precautions for exchanging data with socket communications.

Port number

Port numbers 1 to 1023 are typically reserved port numbers (WELL KNOWN PORT NUMBERS) and 61440 to 65534 are used by other communication functions, so 1024 to 4999 or 5010 to 61439 should be used for the own station port numbers. 5000 to 5009 are used by the system and must not be specified. (☞ Page 229 Port Numbers Used by Ethernet-equipped Module)

When using the file transfer function (FTP server), do not specify 20 or 21 for socket communications. When using the time setting function (SNTP client), do not specify 123 for socket communications.

Reading received data

If 'Socket/fixed buffer reception status signal' (Un\G1900016 to Un\G1900023) is on, read the received data. The communication could be affected if large amounts of data are not read out for a while.

Accessing a file during communication

The CPU module prioritizes the file access processing over the Ethernet communication processing. Thus, if the file is accessed with FTP, the engineering tool, and so on, during socket communications, the socket communications processing could be delayed.

To access a file while monitoring the response time with the external device with socket communications, add the time required for accessing the file to the monitoring time.

1.5 Communications Using a Fixed Buffer

Communications using a fixed buffer uses TCP/IP and UDP/IP to send and receive arbitrary data with the external device connected to the Ethernet with dedicated instructions in the same manner as exchanging data with socket communications. Arbitrary data can be exchanged between the CPU module and external device using the RJ71EN71 fixed buffer.
The following table lists the differences with socket communications are given below.

Item	Differences	
	Socket communications	Communications using a fixed buffer
Connection send/receive	Send/receive is possible with one connection	Specify send or receive for one connection (Two connections are required for send and receive)

Restriction

The CPU module cannot exchange data with the fixed buffer.

Differences between the "Procedure Exist" and "No Procedure" control methods

"Procedure Exist" and "No Procedure" control methods can be used for fixed buffer communication. The following table lists the differences between "Procedure Exist" and "No Procedure".

Item	Differences	
	Procedure Exist	No Procedure
Message format	Data is sent and received with the predetermined data format.	Data is sent and received according to the external device's message format.
Response for received data	A response is sent for the received data.	No response is sent for the received data.
Data Code	Data can be exchanged with binary code or ASCII code.	Data is exchanged only with binary codes.
Data length specified with dedicated instructions	Specify with a number of words.	Specify with a number of bytes.
Amount of application data per data exchange session*1	Maximum 5113 words (binary code) Maximum 2556 words (ASCII code)	Maximum 10238 bytes

*1 The following value is used if the RJ71EN71 network type is set to "Q Compatible Ethernet".
Procedure Exist: Maximum 1017 words (binary code), maximum 508 words (ASCII code)
No Procedure: Maximum 2046 bytes

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select the external device to be connected in "Module List" and drag it to "List of devices" or "Device map area".

External device name	Description
UDP Connection Module	Select to communicate with the external device using UDP/IP
Active Connection Module	Select to perform the open processing to the external device from the Ethernet-equipped module (Active open) and communicate using TCP/IP.
Unpassive Connection Module	Select to receive the open processing from a unspecified external device (Unpassive open) and communicate using TCP/IP.
Fullpassive Connection Module	Select to receive the open processing from the specified external device (Fullpassive open) and communicate using TCP/IP.

2. Set "Communication Method" for the external device to "Fixed Buffer (Procedure Exist)" or "Fixed Buffer (No Procedure)".

3. Set the "Fixed Buffer Send/Receive Setting".

4. Set the other parameters required for communication in the connection.

Applicable dedicated instructions

The following table lists the dedicated instructions used for communications using a fixed buffer.
For details on dedicated instructions, refer to the following.
MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

List of dedicated instructions

The following table lists the dedicated instructions used by each module.

Instruction	Description
GP.CONOPEN*1	Establishes a connection.
OPEN	
GP.CONCLOSE*1	Closes the connection.
CLOSE	
BUFRCV	Reads the receive data from the external device.
BUFRCVS	Reads the receive data with an interrupt program.
BUFSND	Sends data to the external device.

*1 This function cannot be used when "Q Compatible Ethernet" is selected in the network type.

Applicable connections

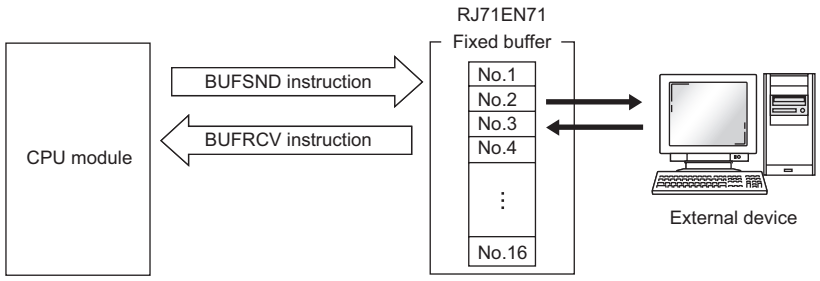
The connections No.1 to 16 of the P1 connector can be used for the communications using a fixed buffer.
Communications using a fixed buffer cannot be used with the P2 connector.

Communication structure

This section describes the mechanism of communication with fixed buffer communication.

Data flow

Dedicated instructions are used to send and receive data in fixed buffer communication (☞ Page 61 Applicable dedicated instructions)
With "Procedure Exist", the CPU module and external device exchange data one-on-one. A handshake is established with the external device when sending data form the CPU module and receiving data from the external device.
With "No Procedure", data is sent from the CPU module and received from the external device without a procedure.

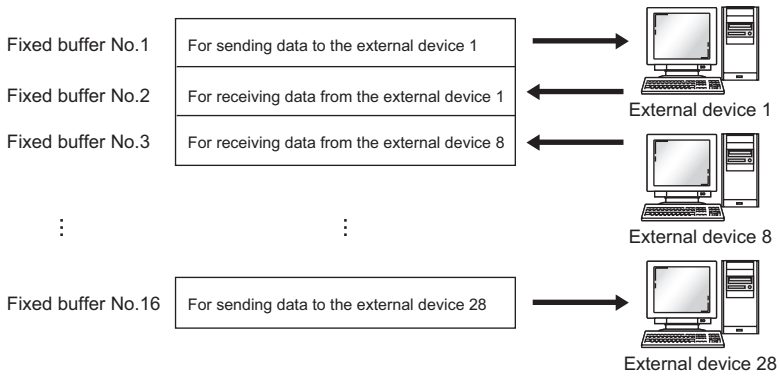


External devices capable of data exchange

Data can be exchanged with the following external devices.

- Devices in Ethernet to which the RJ71EN71 is connected
- Device connected via router

As the following figure shows, the external device for communication and the working application (for send/receive and "Procedure Exist"/"No Procedure") are set in the "External Device Configuration" using each fixed buffer (No.1 to No.16), and the external device for each buffer is fixed.


Fixed buffer No.1
For sending data to the external device 1
Fixed buffer No.2
For receiving data from the external device 1
Fixed buffer No.3
For receiving data from the external device 8
Fixed buffer No.16
For sending data to the external device 28
External device 1
External device 8
External device 28

Pay attention to the following when changing the external device.

- During TCP/IP communications, the external device can be changed only when a connection is not established with the external device (when the open completion signal is off).
- During UDP/IP communications, the external device can be changed regardless of the connection status with the external device.
- When changing the external device, do not use the pairing open or alive check function.

Processing during data send/receive

■During data send

When the BUFSND instruction is executed, the RJ71EN71 sends data from the corresponding fixed buffer to the external device set in the specified connection.

■During data reception

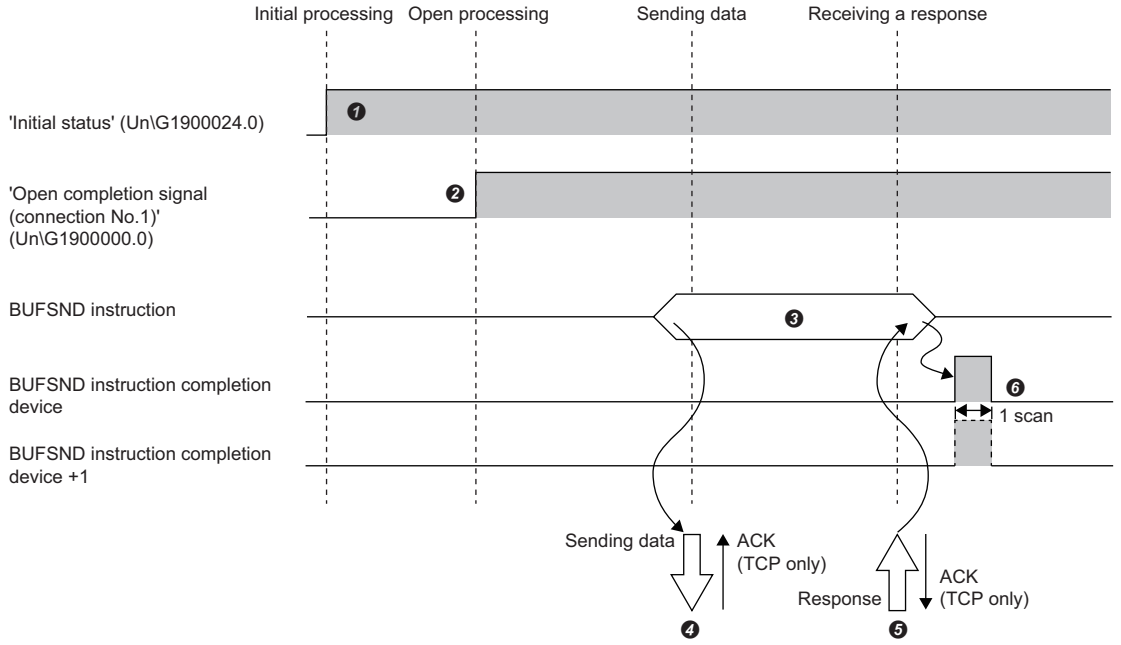
If the data is being received from an external device set in the specified connection, the RJ71EN71 processes the reception. If data is being received from an external device that is not set in the specified connection, the RJ71EN71 will ignore the received data.

Send procedure

The following figure shows the processing order when sending data from the RJ71EN71 to the external device.

Procedure exists

The following figure shows the send processing for the fixed buffer No.1 area corresponding to the connection No.1.



❶ Normal completion of the initial processing is checked. ('Initial status' (Un\G1900024.0): On)
❷ A connection is established with the RJ71EN71 and external device, and normal completion of the connection No.1 open processes is checked. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
❸ The BUFSND instruction is executed. (Sends data)
❹ The data length amount of send data in the fixed buffer No.1 area is sent to the external device.
❺ When the external device receives the data form the RJ71EN71, returns a response to the RJ71EN71.
❻ When a response is received from the external device, the RJ71EN71 finishes data send. If the response is not returned within the response monitor timer value, a data send error occurs. *1 If the data send completes abnormally, execute the BUFSND instruction again and start the send processing.

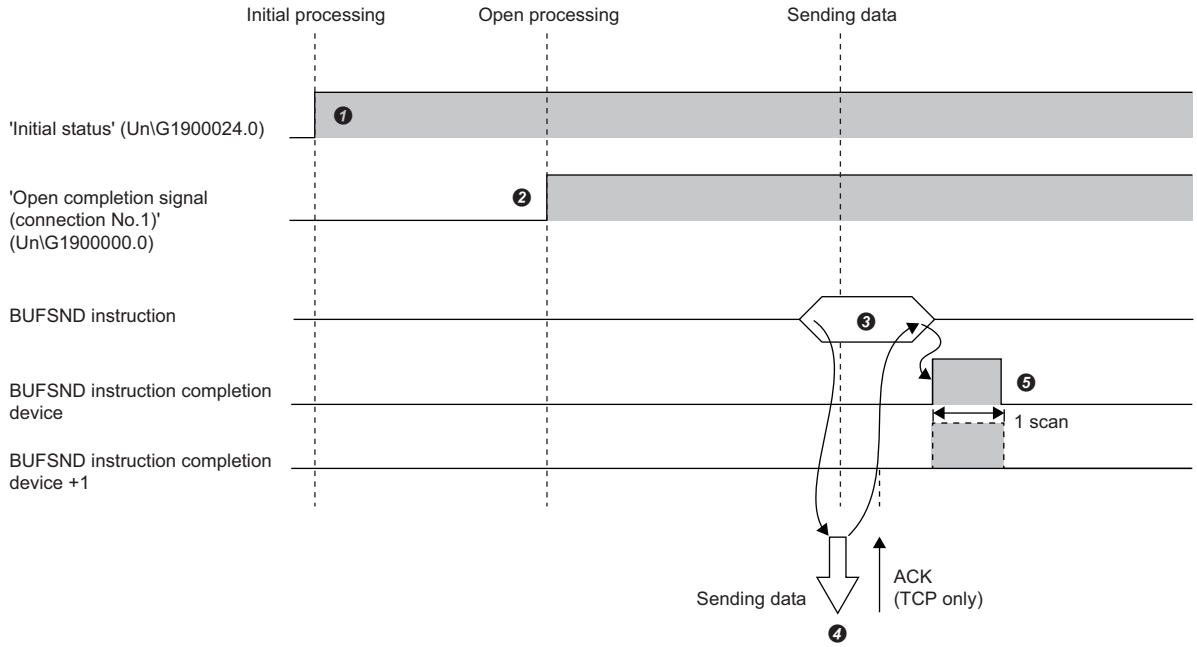
*1 Adjust the monitor timer value with the parameters. (☞ Page 135 Timer Settings for Data Communication)

Point

- The details of the open setting are enabled at the rising edge of the RJ71EN71 open completion signal.
- Send the next data (command) after the data exchange has been completed for the previous data (command) send.
- When sending or receiving data to multiple external devices, the data can be sent sequentially. However, to avoid communication trouble, it is recommended to switch the external device and send/receive the data. When using a connection opened with UDP/IP, the setting value in the communication address setting area can be changed before sending or receiving to switch the external device.

No procedure

The following figure shows the send processing for the fixed buffer No.1 area corresponding to the connection No.1.



❶ Normal completion of the initial processing is checked. ('Initial status' (Un\G1900024.0): On)
❷ A connection is established with the RJ71EN71 and external device, and normal completion of the connection No.1 open processes is checked. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
❸ The BUFSND instruction is executed. (Sends data)
❹ The data length amount of send data in the fixed buffer No.1 area is sent to the external device.
❺ The RJ71EN71 finishes sending the data. If the data send completes abnormally, execute the BUFSND instruction again and start the send processing.

Point

During DUP/IP communications, if the RJ71EN71 internal processing completed normally, the data send processing may end normally even if the communication line between the CPU module and external device is disconnected because of a connection cable disconnection or other causes. Thus, providing a communication procedure and sending/receiving data is recommended.

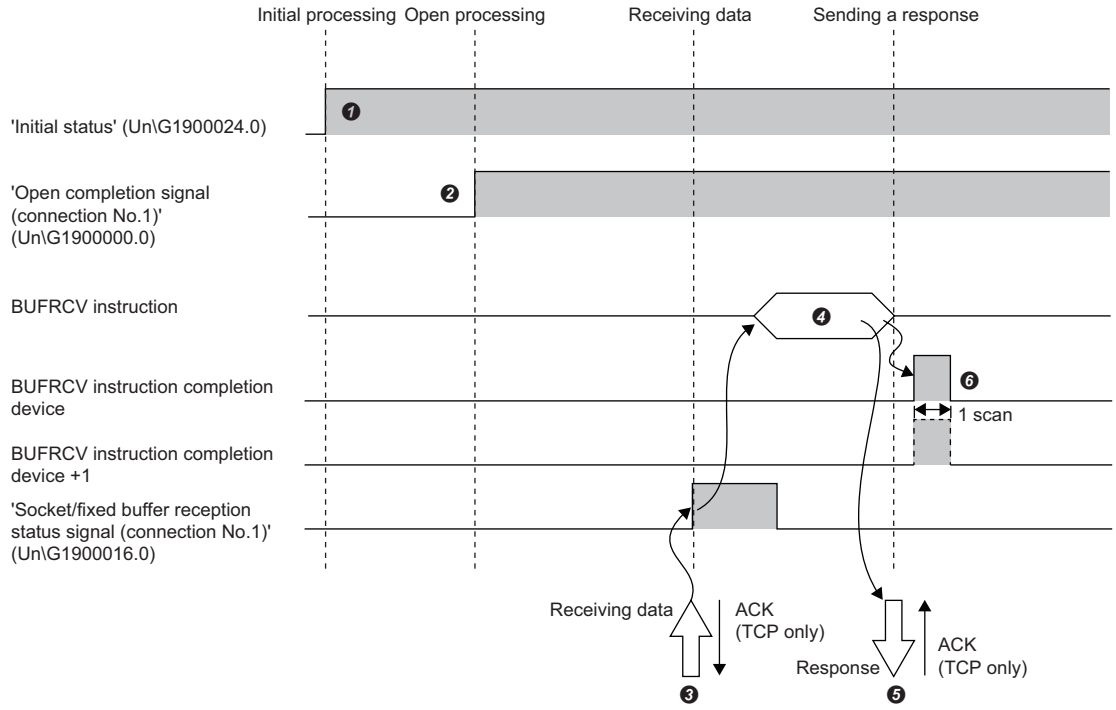
Receive procedure

The following figure shows the processing for the RJ71EN71 to receive data from the external device. The following receive methods can be used.

- Receiving with main program (BUFRCV instruction)
- Receiving with interrupt program (BUFRCVS instruction)

Receiving with main program (procedure exists)

The following figure shows the receive processing for the fixed buffer No.1 area corresponding to the connection No.1.



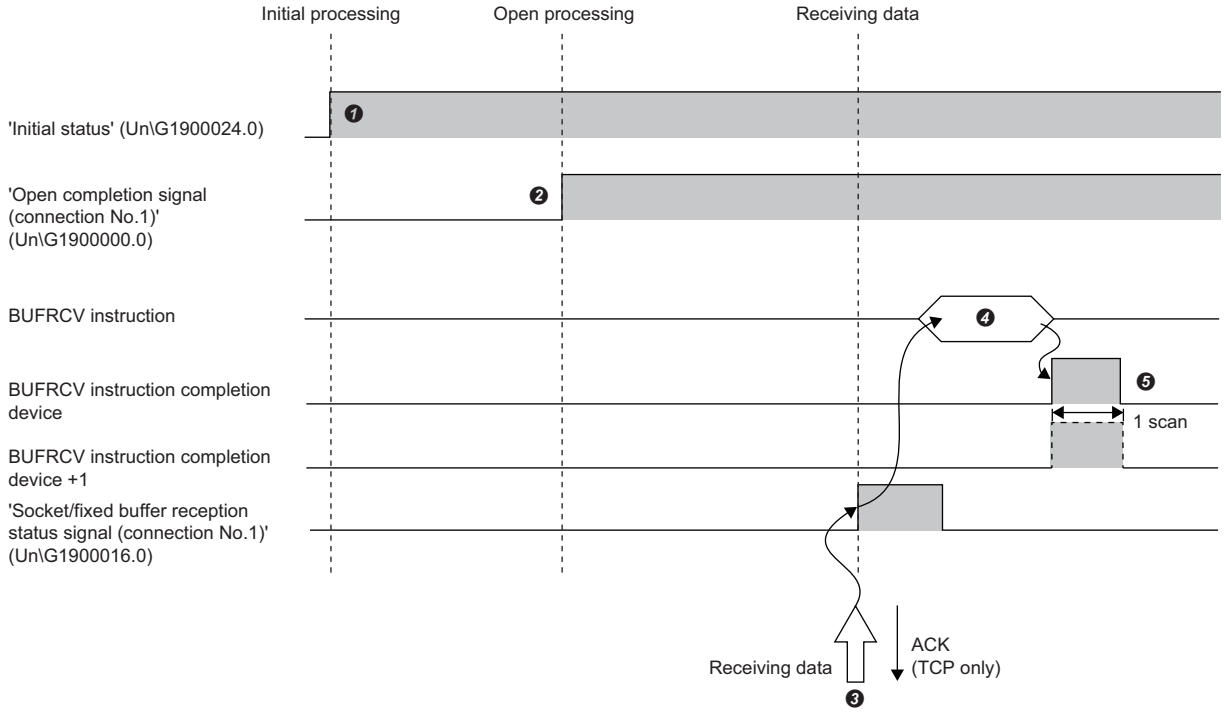
❶ Normal completion of the initial processing is checked. ('Initial status' (Un\G1900024.0): On)
❷ A connection is established with the RJ71EN71 and external device, and normal completion of the connection No.1 open processes is checked. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
❸ Data is received from the external device. ('Socket/fixed buffer reception status signal (connection No.1)' (Un\G1900016.0): On)
❹ The BUFRCV instruction is executed, and the receive data length and receive data are read from the fixed buffer No.1. ('Socket/fixed buffer reception status signal (connection No.1)' (Un\G1900016.0): Off)
❺ When reading of the receive data length and receive data is completed, a response is returned to the external device.
❻ The receive processing ends. If the data reception completes abnormally, execute the BUFRCV instruction again and start the receive processing.

Point

- The details of the open setting are enabled at the rising edge of the RJ71EN71 open completion signal.
- Execute the BUFRCV instruction when the socket/fixed buffer reception status signal changes from OFF to ON.
- The socket/fixed buffer reception status signal does not turn on when abnormal data is received. In addition, data is not stored in the fixed buffer No.1 area.

Receiving with main program (no procedure)

The following figure shows the receive processing for the fixed buffer No.1 area corresponding to the connection No.1.



❶ Normal completion of the initial processing is checked. ('Initial status' (Un\G1900024.0): On)
❷ A connection is established with the RJ71EN71 and external device, and normal completion of the connection No.1 open processes is checked. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
❸ Data is received from the external device. ('Socket/fixed buffer reception status signal (connection No.1)' (Un\G1900016.0): On)
❹ The BUFRCV instruction is executed, and the receive data length and receive data are read from the fixed buffer No.1. ('Socket/fixed buffer reception status signal (connection No.1)' (Un\G1900016.0): Off)
❺ The receive processing ends. If the data reception completes abnormally, execute the BUFRCV instruction again and start the receive processing.

Point

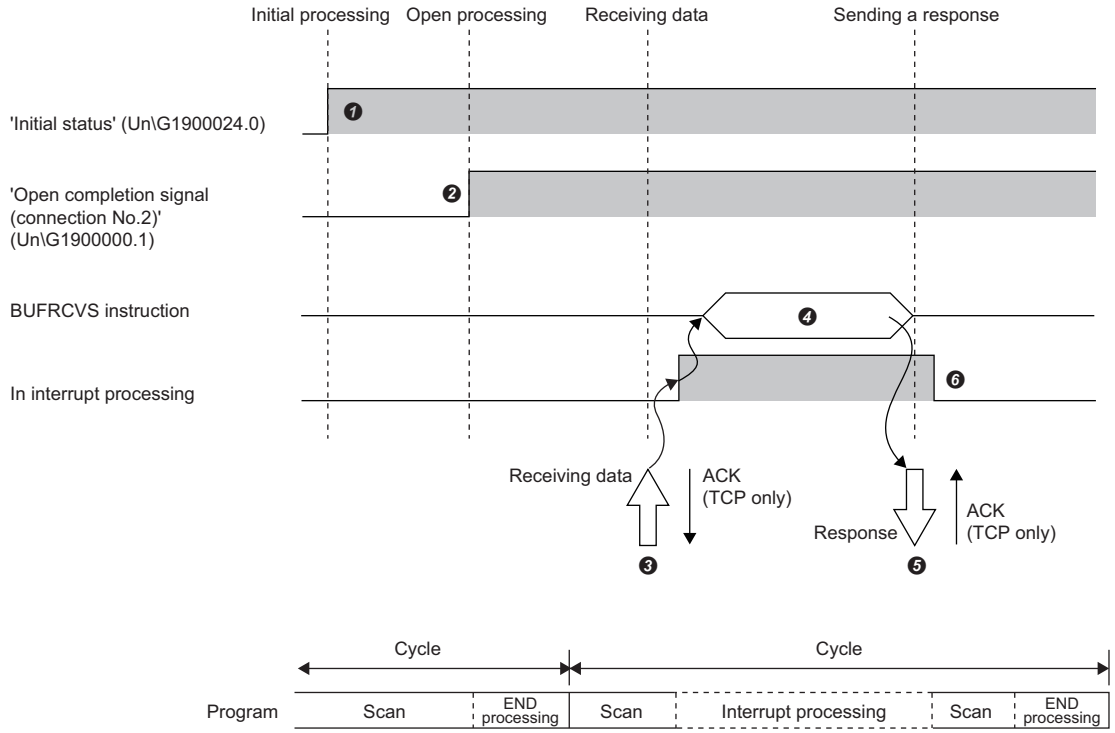
- The details of the open setting are enabled at the rising edge of the RJ71EN71 open completion signal.
- Execute the BUFRCV instruction when the socket/fixed buffer reception status signal changes from OFF to ON.
- The socket/fixed buffer reception status signal does not turn on when abnormal data is received. In addition, data is not stored in the fixed buffer No.1 area.

Reception with interrupt program (procedure exists)

Use the BUFRCVS instruction for receiving data with the interrupt program. The interrupt program is started when data is received from the external device. It enables the reading of receive data to the CPU module.

The "Interrupt Settings" are required to use the interrupt program. (☞ Page 147 Interrupt Settings)

The following figure shows the receive processing for the fixed buffer No.2 area corresponding to the connection No.2.



❶ Normal completion of the initial processing is checked. ('Initial status' (Un\G1900024.0): On)

❷ A connection is established with the RJ71EN71 and external device, and normal completion of the connection No.2 open processing is checked. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)

❸ The CPU module is requested to start the interrupt program, and data is received from the external device. ('Socket/fixed buffer reception status signal (connection No.2)' (Un\G1900016.1): On)

❹ The interrupt program starts. The BUFRCVS instruction is executed, and the receive data length and receive data are read from the fixed buffer No.2. ('Socket/fixed buffer reception status signal (connection No.2)' (Un\G1900016.1): Off)

❺ When reading of the receive data length and receive data is completed, a response is returned to the external device.*1

❻ Execution of the interrupt program ends, and execution of the main program resumes.

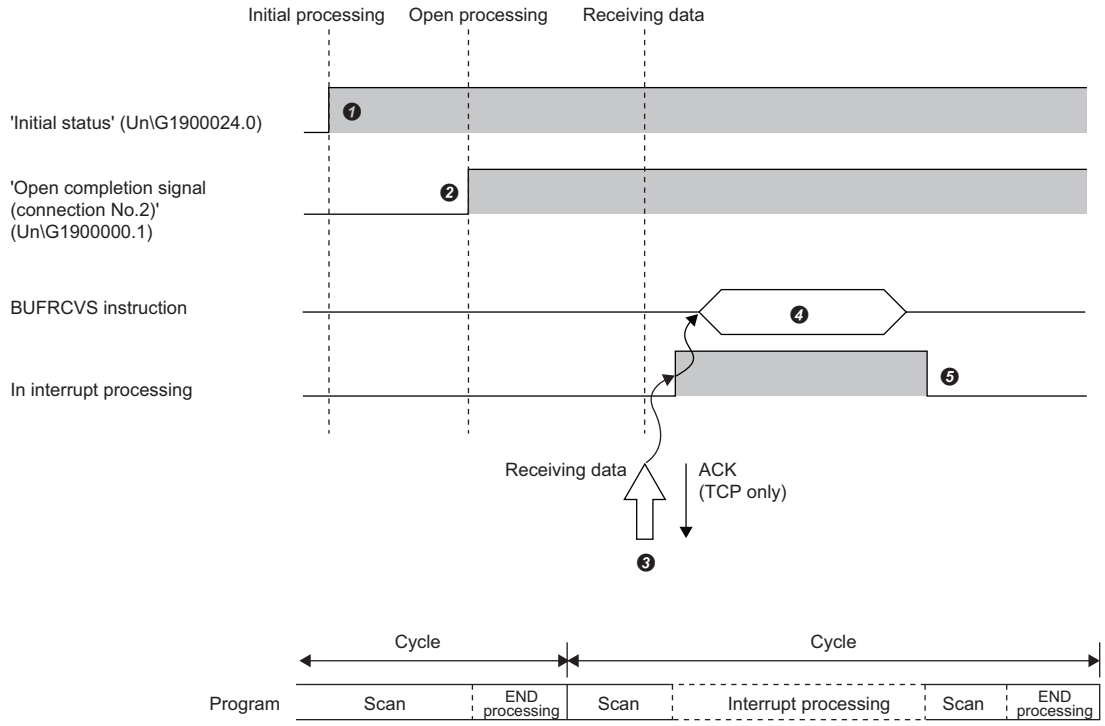
*1 A response is not returned when the execution completes abnormally.

Reception with interrupt program (no procedure)

Use the BUFRCVS instruction for receiving data with the interrupt program. The interrupt program is started when data is received from the external device. It enables the reading of receive data to the CPU module.

The "Interrupt Settings" are required to use the interrupt program. (☞ Page 147 Interrupt Settings)

The following figure shows the receive processing for the fixed buffer No.2 area corresponding to the connection No.2.



❶ Normal completion of the initial processing is checked. ('Initial status' (Un\G1900024.0): On)

❷ A connection is established with the RJ71EN71 and external device, and normal completion of the connection No.2 open processing is checked. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)

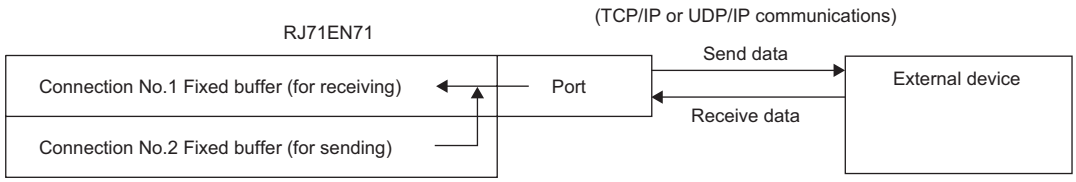
❸ The CPU module is requested to start the interrupt program, and data is received from the external device. ('Socket/fixed buffer reception status signal (connection No.2)' (Un\G1900016.1): On)

❹ The interrupt program starts. The BUFRCVS instruction is executed, and the receive data length and receive data are read from the fixed buffer No.2. ('Socket/fixed buffer reception status signal (connection No.2)' (Un\G1900016.1): Off)

❺ Execution of the interrupt program ends, and execution of the main program resumes.

Pairing open

Pairing open is an opening method that pairs a fixed buffer communication reception connection and send connection, and establishes a connection using one port each from the own station and external device.
When pairing open is specified, data can be exchanged with two connections using an open processing for one port.



Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select the external device to be connected in "Module List" and drag it to "List of devices" or "Device map area".
2. Set "Communication Measure" for the external device.
3. Set the "Fixed Buffer Send/Receive Setting" with the external device to "Pairing (Receive)". *1
4. Set the other parameters required for communication in the connection.
5. Select the same external device as step 1 from the "Unit List", and drag to the next connection number of the external device set in step 1.
6. Set "Communication Method" for the external device to the same as the external device set in step 1.
7. Set the "Fixed Buffer Send/Receive Setting" with the external device to "Pairing (Send)".
8. Set the other parameters to the same values as the external device set in Step (1).

*1 Set "Pairing (Receive)" to connection No.1 to 7, or No.9 to 15.

Point

- The external devices with which data can be exchanged with pairing open are those in the Ethernet to which RJ71EN71 is connected and devices connected via a router.
- The open/close processing for the next connection (send connection) is executed automatically using the open/close processing on the receive connection side set to pairing open.

Broadcast communications

Broadcast communications is a communication method that does not specify the external device. Data is exchanged between all Ethernet-equipped module stations and external devices on the same Ethernet to which the Ethernet-equipped modules are connected.

Item	Description
Broadcast sending	The same data is sent to all Ethernet devices on the same Ethernet.
Broadcast receiving	The data sent with broadcast send is received.

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select "UDP Connection Module" in "Module List" and drag it to "List of devices" or "Device map area".
2. Set "Communication Method" for the external device to "Broadcast Send" or "Broadcast Receive".
3. Set the other parameters required for communication in the connection.

Point

Access via a router is not permitted when using broadcast send.

Precautions for broadcast communication

- Decide the dedicated port number for broadcast communication in the system, and use that number.
- Access via a router is not permitted when using broadcast send.
- The external device connected on the same Ethernet must carry out a read/discard processing if the message received with broadcast receiving is not required.

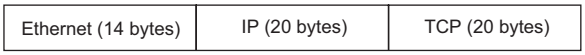
Data Format

This section describes the data format used during communications using a fixed buffer.
The communication data is configured of the header and application data.

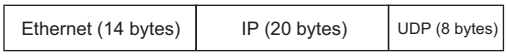
Header

The header is for TCP/IP or UDP/IP. The RJ71EN71 automatically adds and deletes the header, so it does not need to be set. The contents of the header are shown below.

- TCP/IP

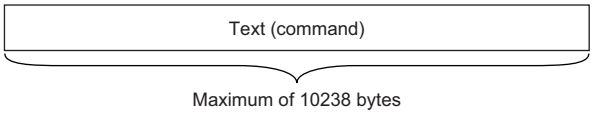


- UDP/IP



Application data

If the communication procedure is "Fixed Buffer (No Procedure)", the application data expresses the following data code with binary codes. Data is exchanged with binary codes regardless of the communication data code setting.



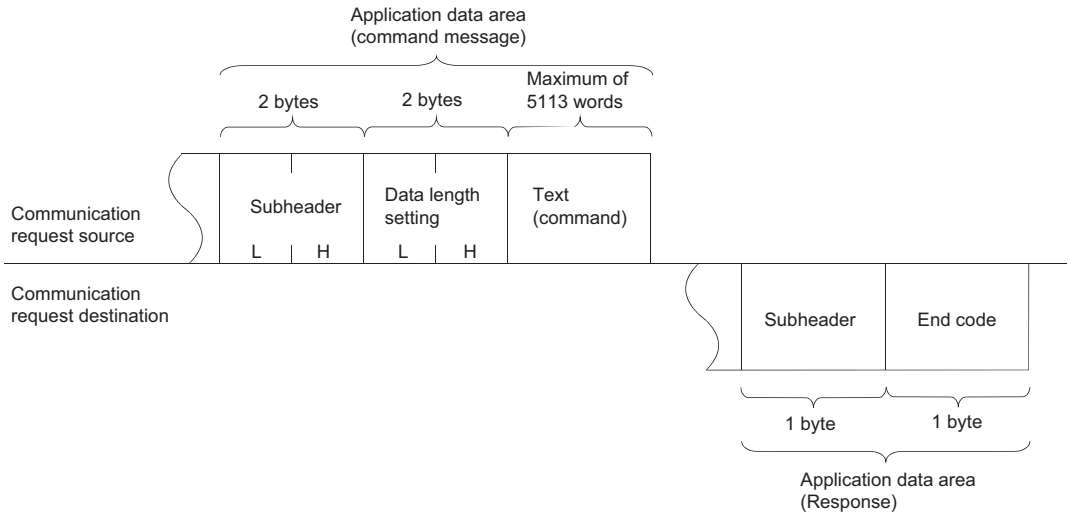
Point

With nonprocedural, the subheader and data length added for procedural are not used, so the data is all handled as valid text. The RJ71EN71 turns on the fixed buffer reception status signal after storing the size of the received message (packet) in the receive data length storage area. Providing a check procedure including the data length, data type code, and so on, in the message's application data is recommended so that the application data's byte size and data type can be seen on the receiving side.

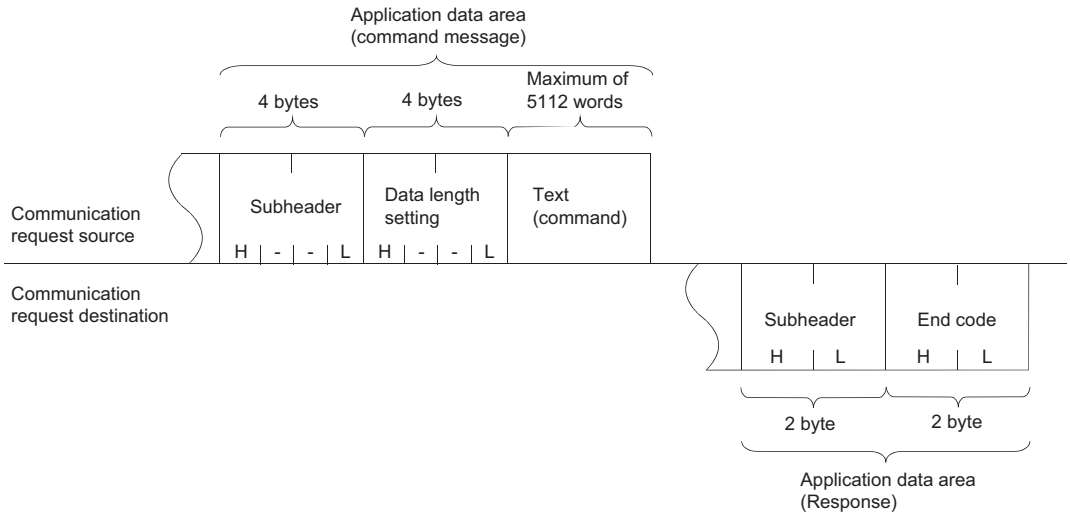
The following figure shows the configuration of the application data when the communication procedure is set to "Fixed Buffer (Procedure Exist)".

■Format

- When exchanging data with binary codes

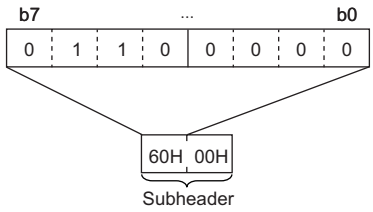
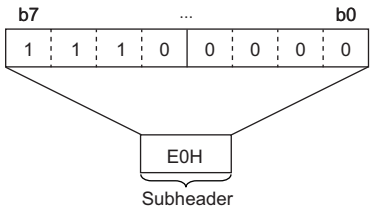
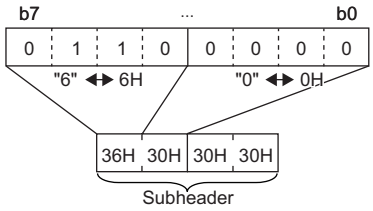
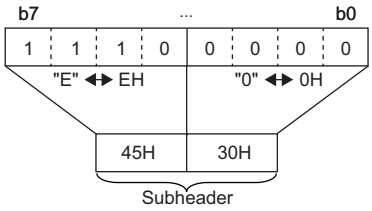


- When exchanging data with ASCII codes



■Subheader

The RJ71EN71 automatically adds and deletes the header, so it does not need to be set.

Data Format	Command (external device → RJ71EN71)	Response (RJ71EN71 → external device)
Binary code		
ASCII code		

■Data length setting

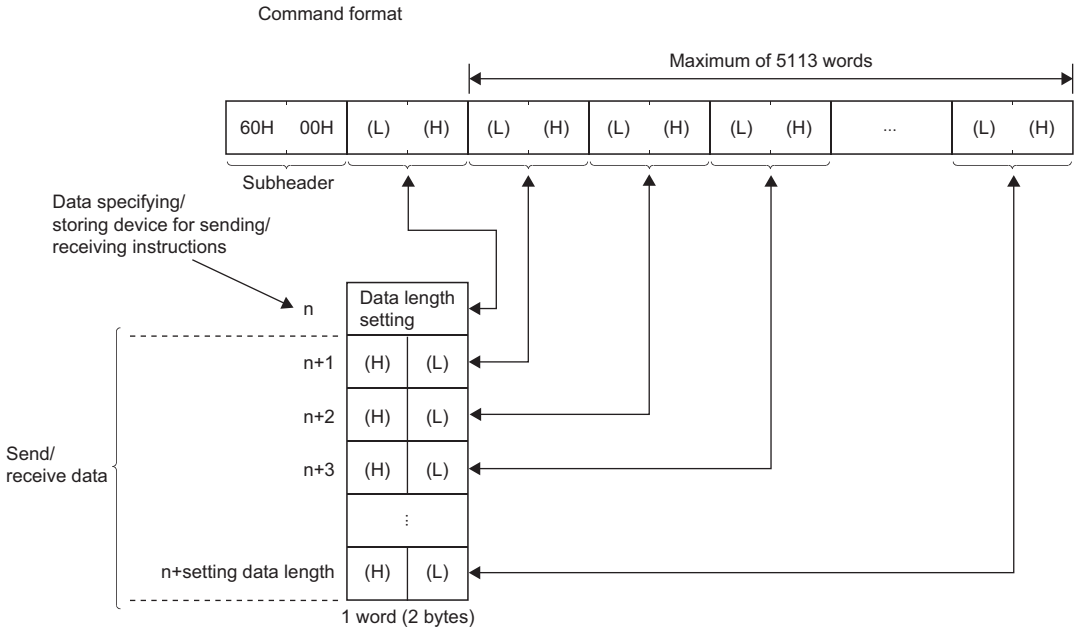
Shows the amount of data in the text (command) section.

- When exchanging data with binary codes: Maximum 5113 words
- When exchanging data with ASCII codes Maximum 2556 words

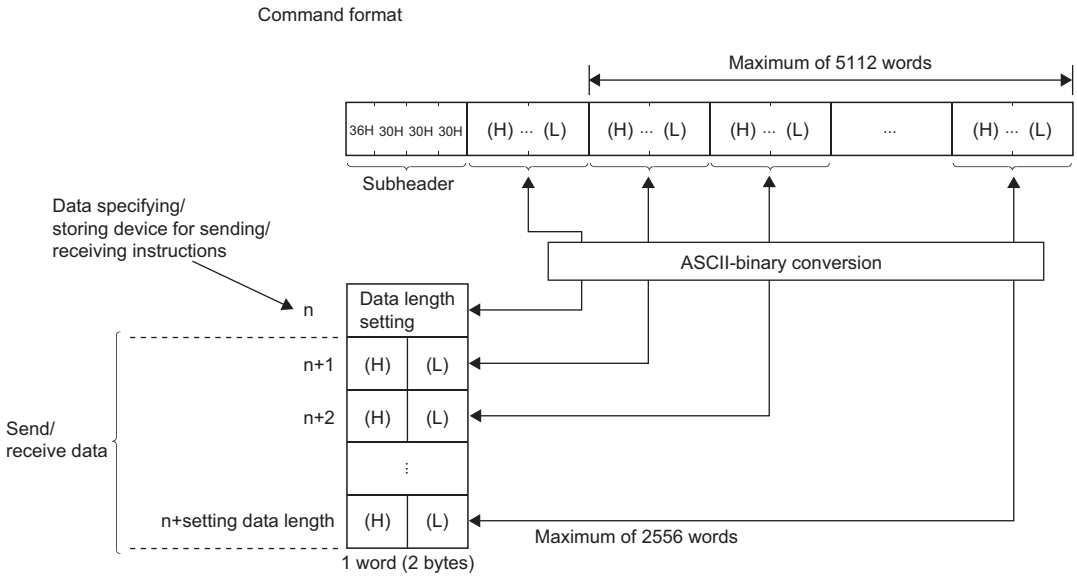
■Text (command)

Shows the format of the command/response.

- When exchanging data with binary codes



- When exchanging data with ASCII codes



■End code

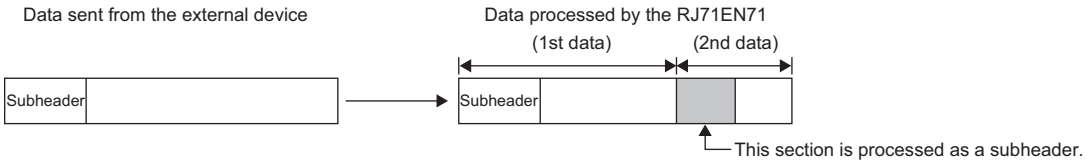
The error code is stored in the end command added to the response. (☞ Page 186 End Codes Returned to an External Device During Data Communications)

The end code is also stored in the BUFSND instruction and BUFRVC instruction completion status area (inside control data).

The following cases may apply if an error code for communications using SLMP or random access buffer is stored even when executing communications using a fixed buffer.

Description	Remedy method
The data length specified in the application data section of the message sent from the external device to the RJ71EN71 differs from the actual data size in the text section.	Specify the actual data size in the text section as the data length in the application data section. (Refer to the following descriptions.)
The subheader of the message sent from the external device to the RJ71EN71 is incorrect.	Review the subheader specified in the application data section.

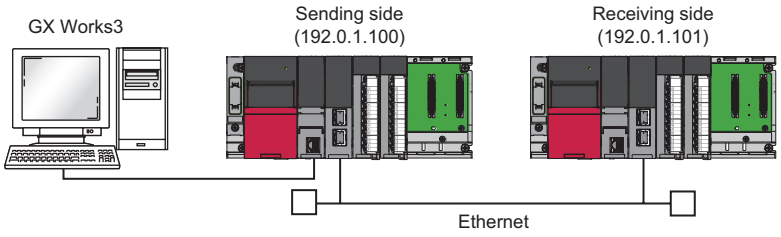
The exchanged data may be split and exchanged due to buffer limitations to the own station or external station. The data that is split and received is restored (reassembled) by the RH71EN71 and exchanged. (The received data is restored (reassembled) based on the data length in the exchanged data.) The RJ71EN71 processing that takes place when the data in the exchange data is incorrect is shown below.

Communication Method	Description
Fixed Buffer (Procedure Exist), Random Access Buffer	When data length specified immediately after subheader < text data volume • The data immediately after the text corresponding to the data length specified immediately after the subheader is handled as the second message. • The start of each statement becomes the subheader, so the RJ71EN71 executes a processing corresponding to the subheader code. • If the subheader is not a code supported by the RJ71EN71, an abnormal completion response is sent to the external device.  In the above case, the code processed as the subheader with the uppermost bit set as 1 is returned as the response. For example, if the command's subheader section is 65H, the response's subheader is E5H.
	When data length specified immediately after subheader > text data volume The RJ71EN71 waits to receive the insufficient remaining data. If the remaining data is received within the response monitor timer value, the RJ71EN71 executes a processing corresponding to the subheader code. If the remaining data is not received within the response monitor timer value, the RJ71EN71 executes the following processing. • The ABORT(RST) instruction is sent to the external device, and the line is closed. • The error code is stored in 'Connection status storage area' (Un\G100 to Un\G163).
Fixed Buffer (No Procedure)	During nonprocedural, there is no message data length, so the received data is stored as is into the receive buffer area. Providing a check procedure including the data length, data type code, and so on, in the message's application data is recommended so that the application data's byte size and data type can be seen on the receiving side.

Example of communications using a fixed buffer

This section describes the socket communications examples using Active open of TCP/IP communications.

System configuration



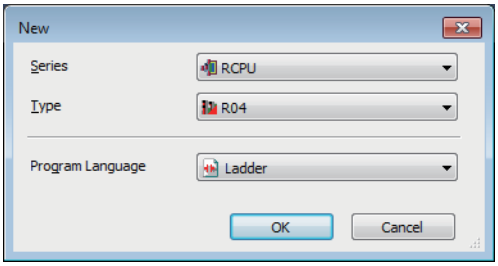
Parameter settings

Connect the engineering tool to the CPU module and set the parameters.

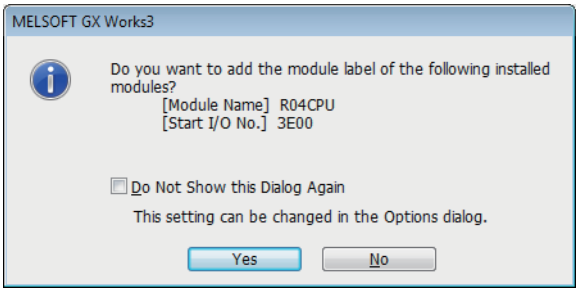
■Sending side

1. Set the CPU module in the following item.

[Project] ⇨ [New]

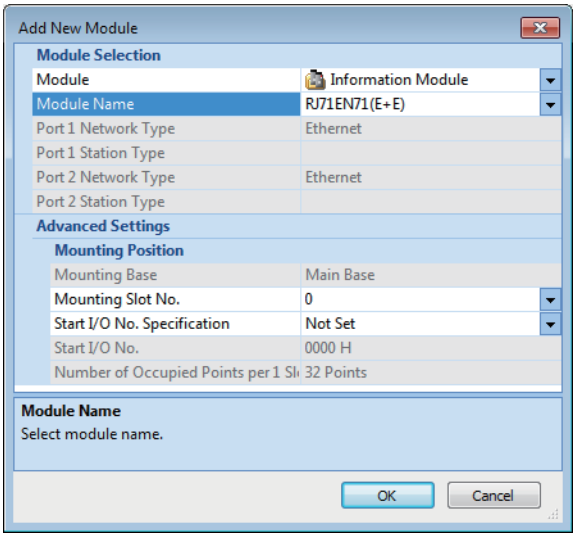


2. Click the [Yes] button to add the module labels of the CPU module.

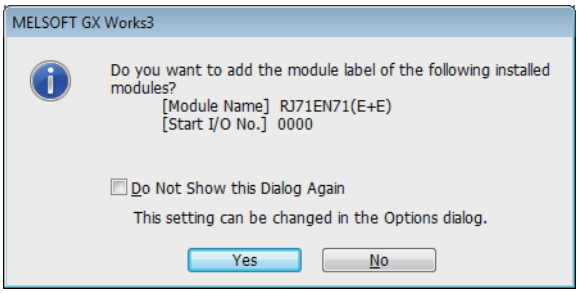

MELSOFT GX Works3
Do you want to add the module label of the following installed modules?
[Module Name] R04CPU
[Start I/O No.] 3E00
Do Not Show this Dialog Again
This setting can be changed in the Options dialog.
Yes
No

3. Set the RJ71EN71 in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]

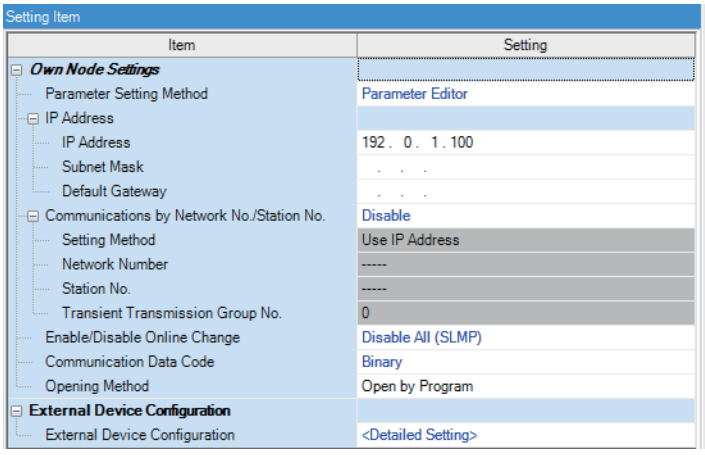


4. Click the [Yes] button to add a module label of the RJ71EN71.


MELSOFT GX Works3
Do you want to add the module label of the following installed modules?
[Module Name] RJ71EN71(E+E)
[Start I/O No.] 0000
Do Not Show this Dialog Again
This setting can be changed in the Options dialog.
Yes
No

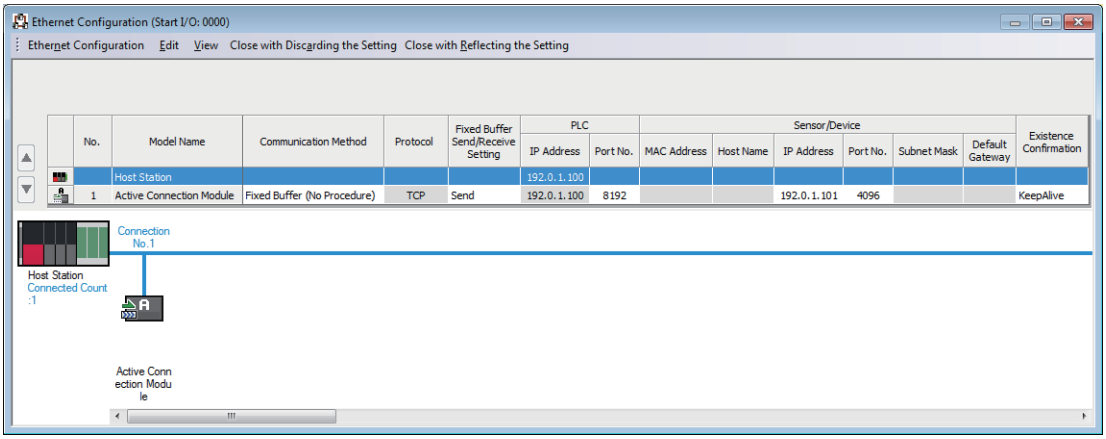
5. Set the "Basic Settings" in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings]



6. Set the network configuration in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings] ⇨ [External Device Configuration]



7. Write the set parameters to the CPU module. Then reset the CPU module or power off and on the system.

[Online] ⇨ [Write to PLC]

Point

In this example, default values were used for parameters that are not shown above. For the parameter setting, refer to the chapter explaining the parameters in this manual. (☞ Page 124 PARAMETER SETTINGS)

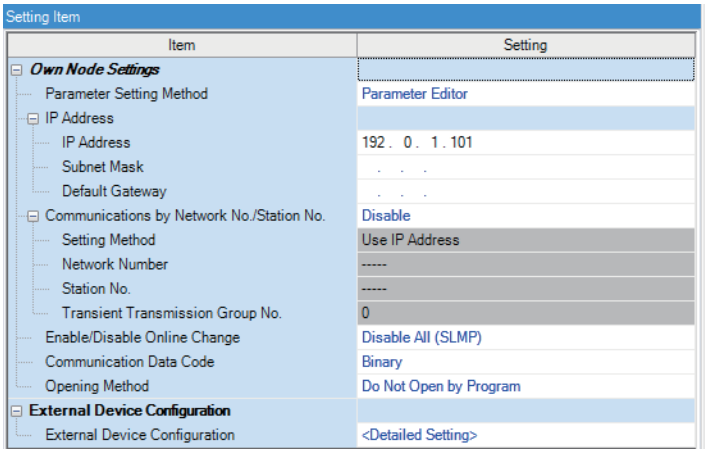
■Receiving side

1. Set the CPU module and add the module labels of the CPU module. The setting method of the CPU module and addition method of the module label are the same as those of when setting the sending side. (☞ Page 75 Sending side)

2. Set the RJ71EN71 and add the module labels of the RJ71EN71. The setting method of the RJ71EN71 and addition method of the module label are the same as those of when setting the sending side. (☞ Page 75 Sending side)

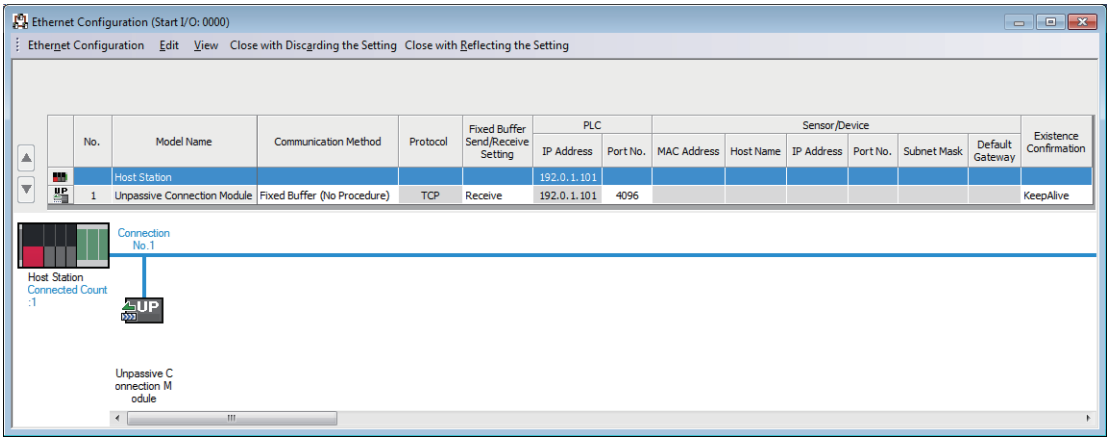
3. Set the "Basic Settings" in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings]



4. Set the network configuration in the following item.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Port 1 Module Parameter (Ethernet)] ⇨ [Basic Settings] ⇨ [External Device Configuration]



5. Write the set parameters to the CPU module. Then reset the CPU module or power off and on the system.

[Online] ⇨ [Write to PLC]

Point

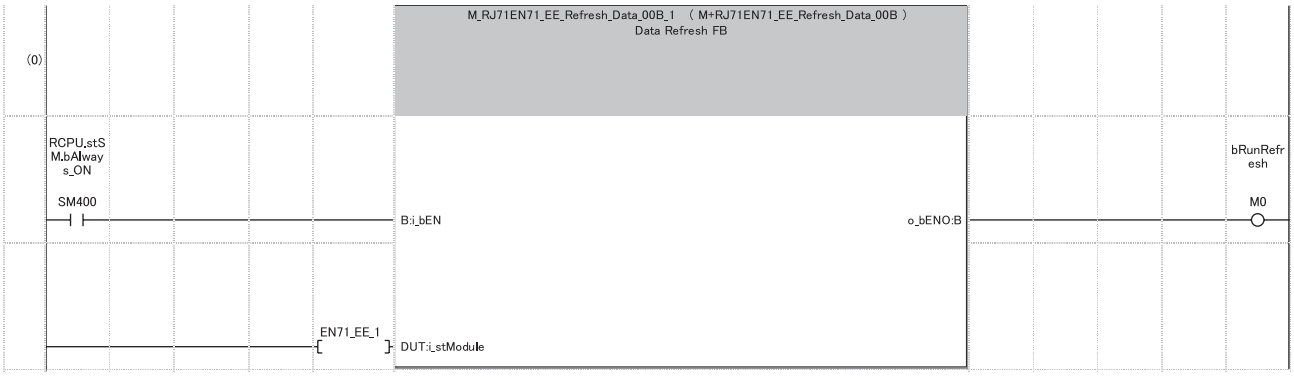
In this example, default values were used for parameters that are not shown above. For the parameter setting, refer to the chapter explaining the parameters in this manual. (☞ Page 124 PARAMETER SETTINGS)

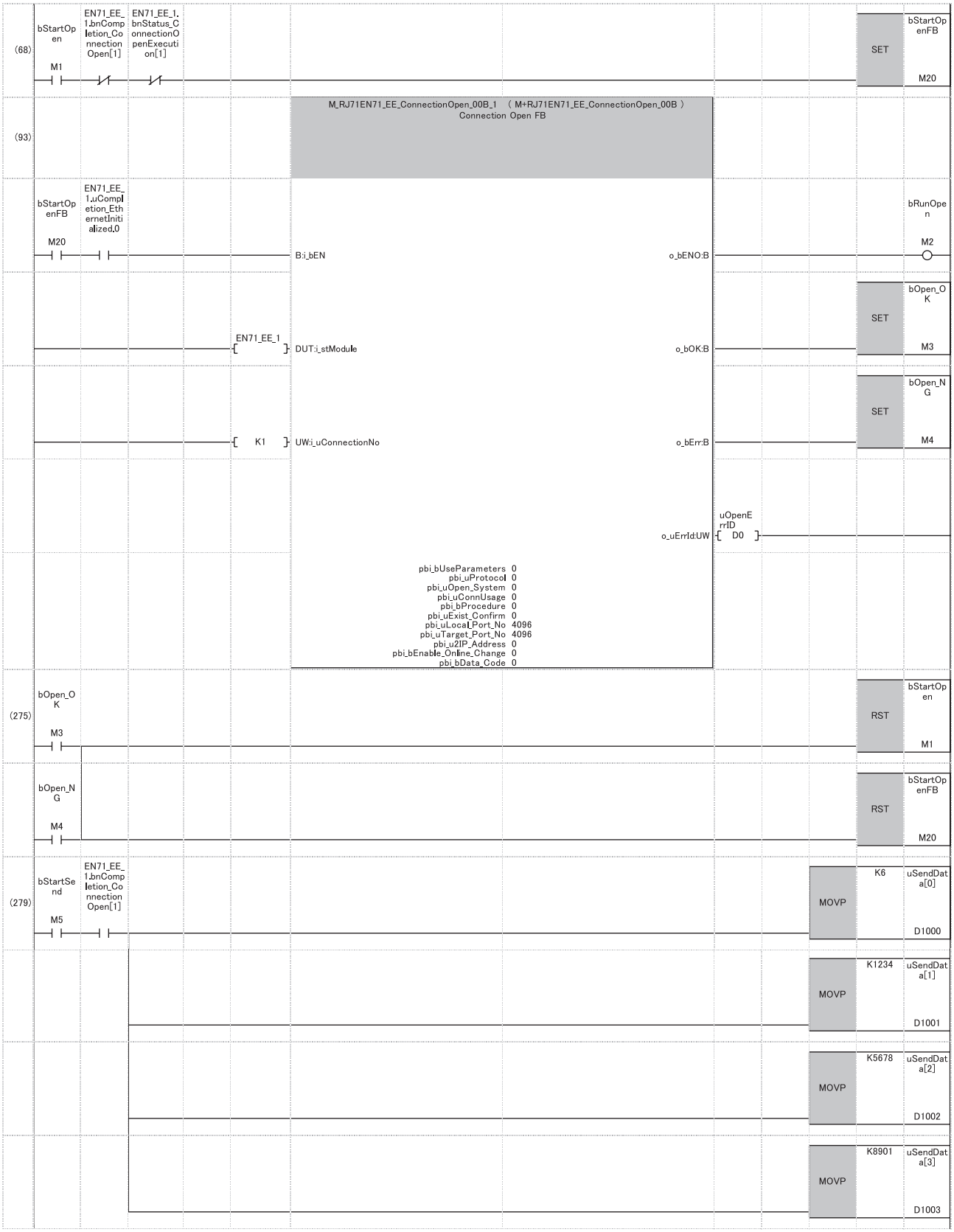
Program examples

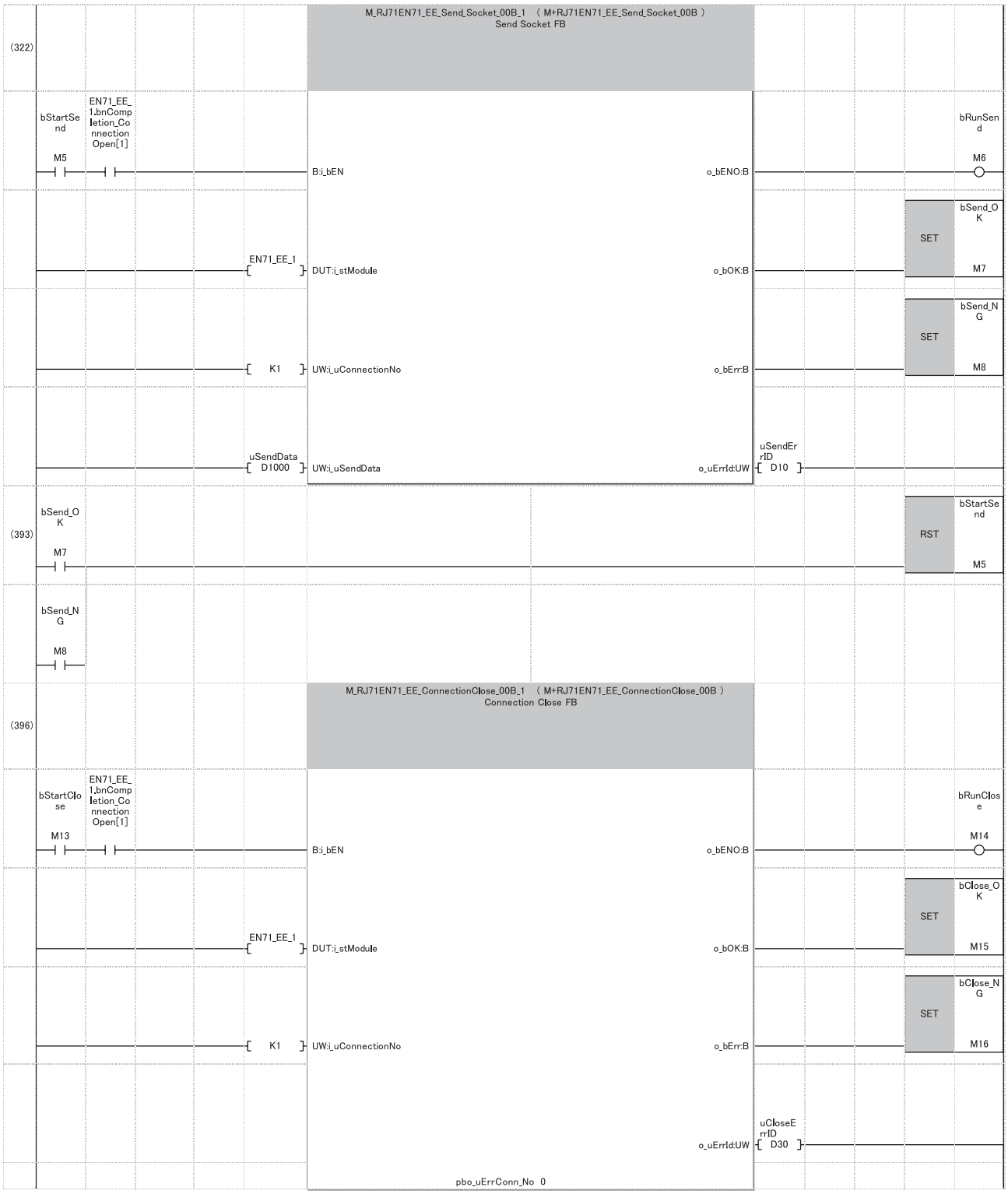
■Sending side

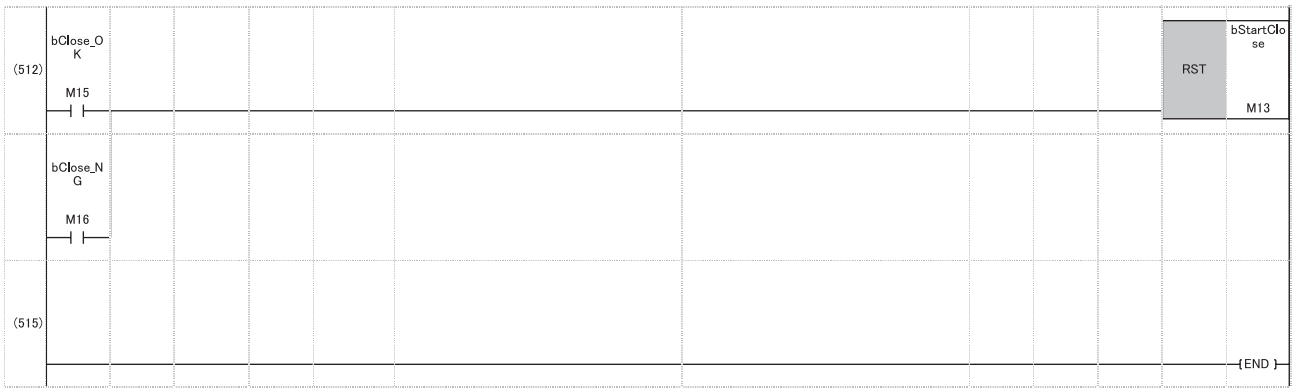
Classification	Label name	Description	Device
Module label	RCPU.stSM.bAlways_ON	Always on	SM400
	EN71_EE_1.bnCompletion_ConnectionOpen[1]	Open completion signal (connection No.1)	U0\G1900000.0
	EN71_EE_1.bnStatus_ConnectionOpenExecution[1]	Open request signal (connection No.1)	U0\G1900008.0
	EN71_EE_1.uCompletion_EthernetInitialized.0	Initial status	U0\G1900024.0
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
bRunRefresh	Bit	...	VAR_GLOBAL	M0
bStartOpen	Bit	...	VAR_GLOBAL	M1
bRunOpen	Bit	...	VAR_GLOBAL	M2
bOpen_OK	Bit	...	VAR_GLOBAL	M3
bOpen_NG	Bit	...	VAR_GLOBAL	M4
bStartSend	Bit	...	VAR_GLOBAL	M5
bRunSend	Bit	...	VAR_GLOBAL	M6
bSend_OK	Bit	...	VAR_GLOBAL	M7
bSend_NG	Bit	...	VAR_GLOBAL	M8
bStartClose	Bit	...	VAR_GLOBAL	M13
bRunClose	Bit	...	VAR_GLOBAL	M14
bClose_OK	Bit	...	VAR_GLOBAL	M15
bClose_NG	Bit	...	VAR_GLOBAL	M16
bStartOpenFB	Bit	...	VAR_GLOBAL	M20
uOpenErrID	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D0
uSendErrID	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D10
uCloseErrID	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D30
uSendData	Word [Unsigned]/Bit String [16-bit](0..3)	...	VAR_GLOBAL	D1000




(68)
bStartOpen
M1
EN71_EE_1.bnCompletion_ConnectionOpen[1]
EN71_EE_1.bnStatus_ConnectionOpenExecution[1]
SET
bStartOpenFB
M20
(93)
M_RJ71EN71_EE_ConnectionOpen_00B_1 （M+RJ71EN71_EE_ConnectionOpen_00B）
Connection Open FB
bStartOpenFB
M20
EN71_EE_1.uCompletion_EthernetInitialized,0
B:i_bEN
o_bENO:B
bRunOpen
M2
SET
bOpen_OK
M3
EN71_EE_1
DUT:i_stModule
o_bOK:B
SET
bOpen_NG
M4
K1
UW:i_uConnectionNo
o_bErr:B
uOpenErrID
D0
o_uErrId:UW
pbi_bUseParameters 0
pbi_uProtocol 0
pbi_uOpen_System 0
pbi_uConnUsage 0
pbi_bProcedure 0
pbi_uExist_Confirm 0
pbi_uLocal_Port_No 4096
pbi_uTarget_Port_No 4096
pbi_u2IP_Address 0
pbi_bEnable_Online_Change 0
pbi_bData_Code 0
(275)
bOpen_OK
M3
RST
bStartOpen
M1
bOpen_NG
M4
RST
bStartOpenFB
M20
(279)
bStartSend
M5
EN71_EE_1.bnCompletion_ConnectionOpen[1]
MOVP
K6
uSendData[0]
D1000
MOVP
K1234
uSendData[1]
D1001
MOVP
K5678
uSendData[2]
D1002
MOVP
K8901
uSendData[3]
D1003


(322)
M_RJ71EN71_EE_Send_Socket_00B_1 （M+RJ71EN71_EE_Send_Socket_00B）
Send Socket FB
bStartSend
M5
EN71_EE_1.bnCompletion_ConnectionOpen[1]
B:i_bEN
o_bENO:B
bRunSend
M6
SET
bSend_OK
M7
EN71_EE_1
DUT:i_stModule
o_bOK:B
SET
bSend_NG
M8
K1
UW:i_uConnectionNo
o_bErr:B
uSendData
D1000
UW:i_uSendData
o_uErrId:UW
uSendErrID
D10
(393)
bSend_OK
M7
RST
bStartSend
M5
bSend_NG
M8
(396)
M_RJ71EN71_EE_ConnectionClose_00B_1 （M+RJ71EN71_EE_ConnectionClose_00B）
Connection Close FB
bStartClose
M13
EN71_EE_1.bnCompletion_ConnectionOpen[1]
B:i_bEN
o_bENO:B
bRunClose
M14
SET
bClose_OK
M15
EN71_EE_1
DUT:i_stModule
o_bOK:B
SET
bClose_NG
M16
K1
UW:i_uConnectionNo
o_bErr:B
uCloseErrID
D30
o_uErrId:UW
pbo_uErrConn_No 0



(0) The refresh processing of the module label is performed. (The processing is required for when using the module function block.)
When the refresh processing is completed, 'bRunRefresh' (M0) is turned on.

(68) When 'bStartOpen' (M1) is turned on, the open processing of connection No.1 is performed.
When the open processing is completed successfully, 'bOpen_OK' (M3) is turned on.

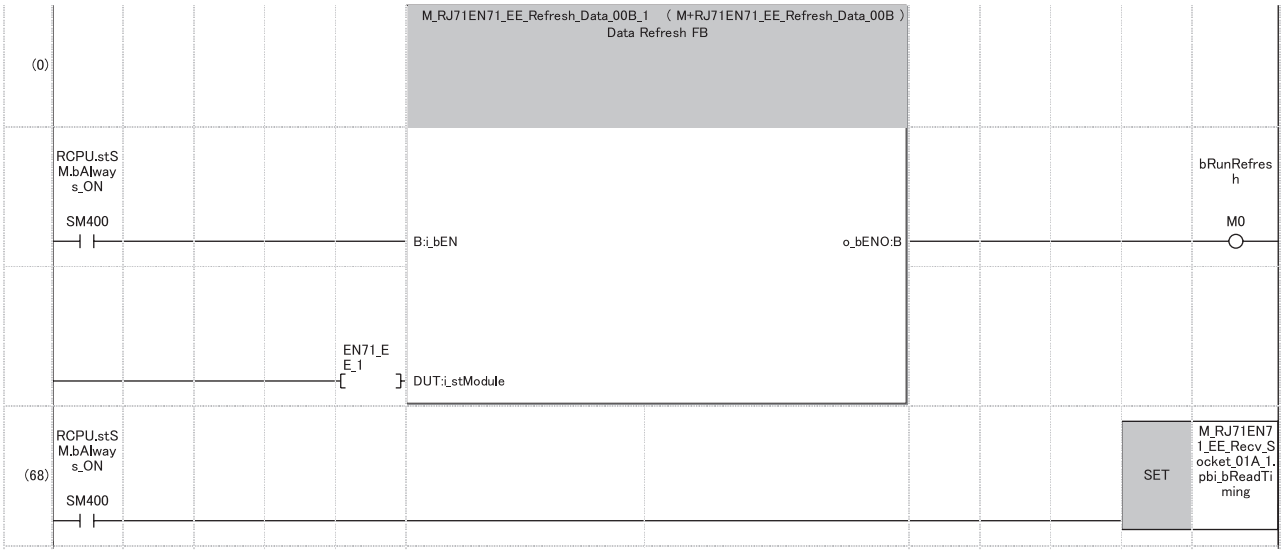
(279) When 'bStartSend' (M5) is turned on, the send data is stored and sent to the receiving side.
When the data send is completed successfully, 'bSend_OK' (M7) is turned on.

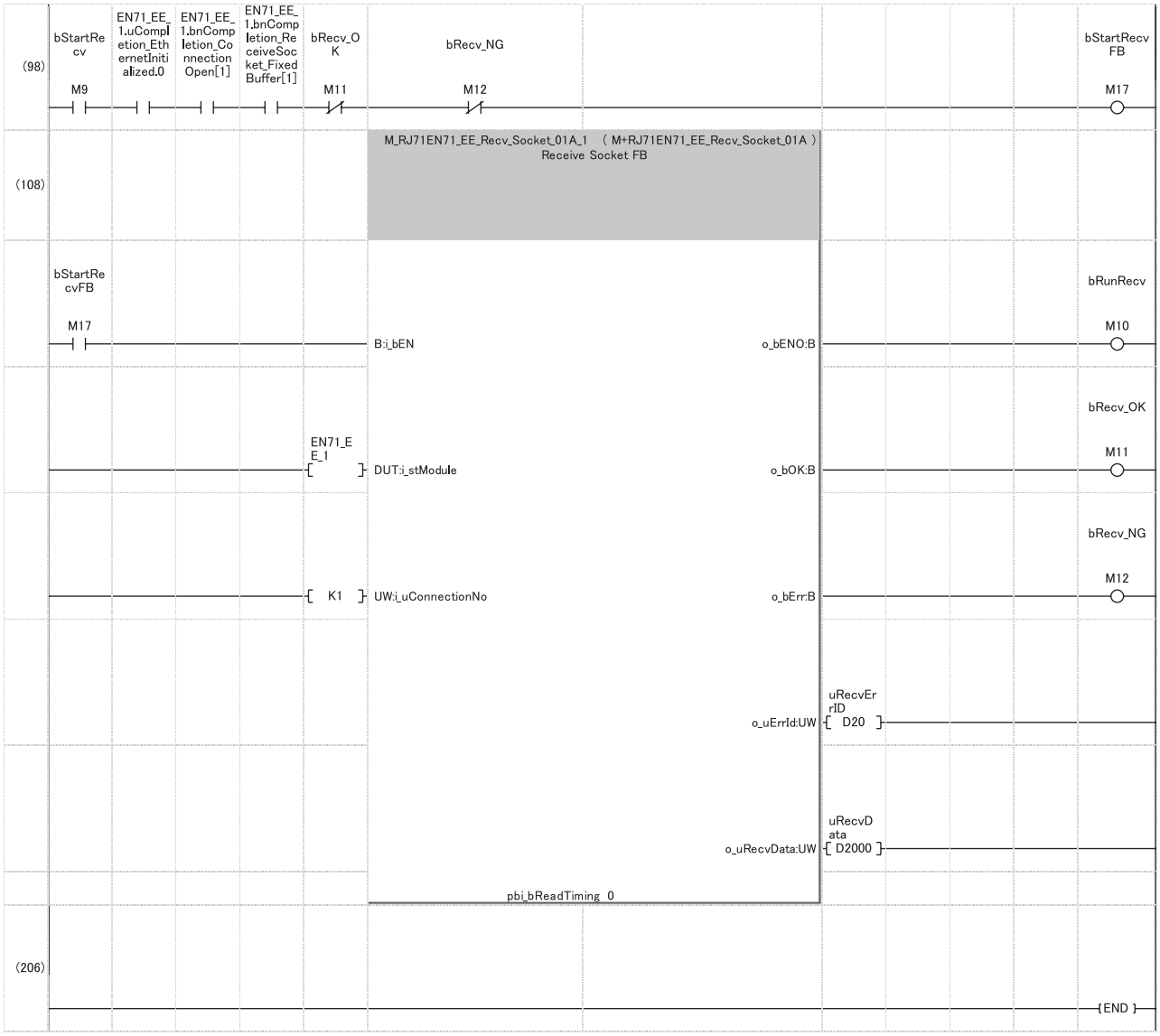
(396) When 'bStartClose' (M13) is turned on, the close processing of connection No.1 is performed.
When the close processing is completed successfully, 'bClose_OK' (M15) is turned on.

■Receiving side

Classification	Label name	Description	Device
Module label	RCPU.stSM.bAlways_ON	Always on	SM400
	EN71_EE_1.bnCompletion_ConnectionOpen[1]	Open completion signal (connection No.1)	U0\G1900000.0
	EN71_EE_1.bnCompletion_ReceiveSocket_FixedBuffer[1]	Socket/fixed buffer reception status signal (connection No.1)	U0\G1900016.0
	EN71_EE_1.uCompletion_EthernetInitialized.0	Initial status	U0\G1900024.0
Label to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
bRunRefresh	Bit	...	VAR_GLOBAL	M0
bStartRecv	Bit	...	VAR_GLOBAL	M9
bRunRecv	Bit	...	VAR_GLOBAL	M10
bRecv_OK	Bit	...	VAR_GLOBAL	M11
bRecv_NG	Bit	...	VAR_GLOBAL	M12
bStartRecvFB	Bit	...	VAR_GLOBAL	M17
uRecvErrID	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D20
uRecvData	Word [Unsigned]/Bit String [16-bit](0..5119)	...	VAR_GLOBAL	D2000





(0) The refresh processing of the module label is performed. (The processing is required for when using the module function block.)
When the refresh processing is completed, 'bRunRefresh' (M0) is turned on.

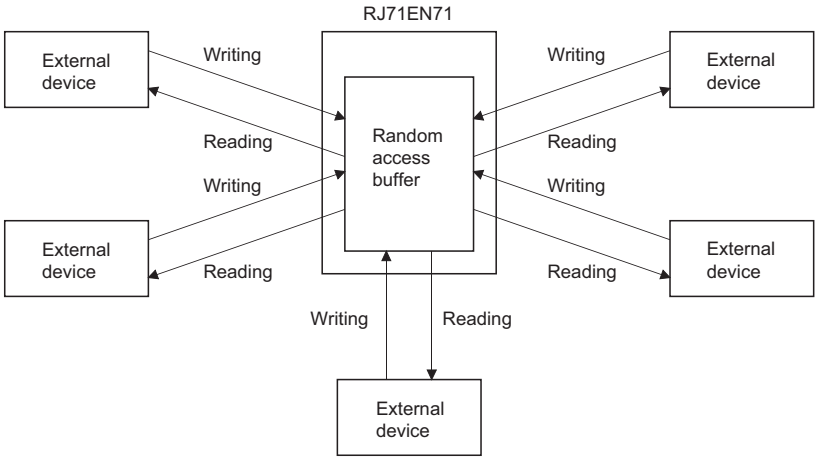
(98) When 'bStartRecv' (M9) is turned on, the data sent from the sending side is received and stored in 'uRecvData' (D2000).
(The device range in which data is stored varies depending on the data length of the received data.)
When the data receive is completed successfully, 'bRecv_OK' (M11) is turned on.

Point

- Secure sufficient device areas according to the maximum length of data sent from the send source to prevent the device areas used for other purposes from being overwritten by the receive data.
- When the data receive is consecutively executed, turn on pbi_bReadTiming (read timing) as shown in the above program.
- To receive data at shorter intervals than the scan time of the CPU module, add the normally closed contact of 'bRecv_OK' (M11) and 'bRecv_NG' (M12) to the execution conditions of FB for receiving as shown in the above program. When there is no normally closed contact of 'bRecv_OK' (M11) and 'bRecv_NG' (M12), 'bStartRecvFB' (M17) is not turned off and on and the FB for receiving may not be executed.

1.6 Communications Using the Random Access Buffer

With communication using the random access buffer, data can be freely read and written between an arbitrary external device (excluding Ethernet-equipped module) and the RJ71EN71. The external device does not need to be fixed. The random access buffer is used as the common buffer area for external devices connected to the Ethernet.



Restriction

The CPU module does not have a random access buffer.

Setting procedure

Set "External Device Configuration" under "Basic Settings". (☞ Page 127 External Device Configuration)

1. Select the external device to be connected in "Module List" and drag it to "List of devices" or "Device map area".

External device name	Description
UDP Connection Module	Select to communicate with the external device using UDP/IP
Active Connection Module	Select to perform the open processing to the external device from the Ethernet-equipped module (Active open) and communicate using TCP/IP.
Unpassive Connection Module	Select to receive the open processing from a unspecified external device (Unpassive open) and communicate using TCP/IP.
Fullpassive Connection Module	Select to receive the open processing from the specified external device (Fullpassive open) and communicate using TCP/IP.

2. Set "Communication Method" for external device to "Random Access Buffer".

3. Set the IP address of the external device.

4. Set the other parameters required for communication in the connection. (☞ Page 127 External Device Configuration)

Communication structure

This section describes the mechanism of communications using the random access buffer.

Data flow

The following figure shows the flow of data communications using the random access buffer.
A dedicated packet is used to exchange data between the RJ71EN71 and external device.
A program is used to access the random access buffer from the CPU module.

Point

The process is executed asynchronously with the program, so if synchronization is required, use socket communications or communications using a fixed buffer.

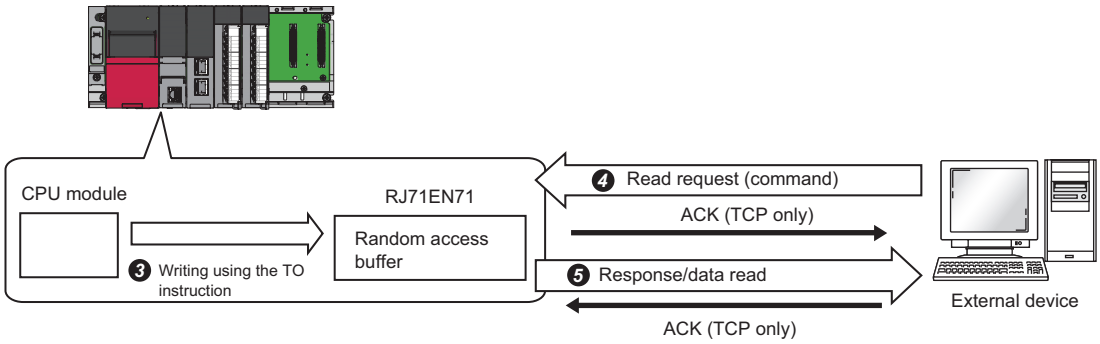
External devices capable of data exchange

Data can be exchanged with the following external devices.

- Devices in Ethernet to which the RJ71EN71 is connected
- Device connected via router

Procedure for reading from external device

The following figure shows the procedure for sending data from the RJ71EN71 in response to a read request from the external device.



❶ After the module parameters are set, check that the RJ71EN71 initial processing has completed normally. ('Initial status' (Un\G1900024.0): On)
❷ The open processing is executed to establish a connection between the RJ71EN71 and external device. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
❸ The program writes the data into the RJ71EN71 random access buffer.
❹ The read request is sent from the external device to the RJ71EN71 asynchronously from the above processing. (RJ71EN71 side: Receives command)
❺ When the read request is received from the external device, the RJ71EN71 sends the data written into the random access buffer to the external device. (RJ71EN71 side: Sends response)
❻ The connection is closed when communication is finished.

Procedure for writing from external device

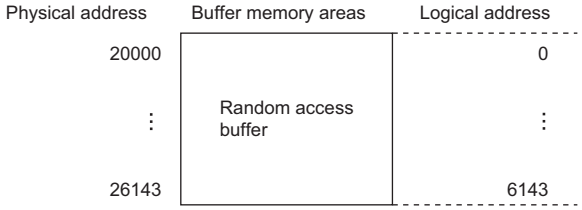
The following figure shows the procedure for writing data from the external device to the RJ71EN71 random access buffer.

1. After the module parameters are set, check that the RJ71EN71 initial processing has completed normally. ('Initial status' (Un\G1900024.0): On)
2. The open processing is executed to establish a connection between the RJ71EN71 and external device. (☞ Page 219 TCP/IP Communications, UDP/IP Communications)
3. Data is written from the external device to the RJ71EN71 random access buffer. (RJ71EN71 side: Receives command)
4. The RJ71EN71 executes the write processing requested by the external device, and returns the write results to the external device that sent the write request. (RJ71EN71 side: Sends response)
5. The data written in the random access buffer is read asynchronously from the above the processing by the program.
6. Close the connection when communication is finished.

Physical address and logical address of random access buffer

This section describes the start address of the RJ71EN71 random access buffer specified in the command.
The address specified for the random access buffer differs from the address specified by the external device and the address specified with the FROM/TO instruction.

- Physical address: Address specified with program's FROM/TO instruction
- Logical address: Address specified by external device in start address item of command



Precautions

The following section lists the precautions for communications using the random access buffer.

Precautions for programming

■Initial processing and open processing completion

The initial processing and connection open processing must be completed.

■Send request from CPU module

Send cannot be requested from the CPU module. Completion of sending to CPU module is not checked. If the data send/receive must be synchronized between the CPU module and external device, use fixed buffer communication.

■Random access buffer address

The address specified by the external device is different from the address specified with the FROM/TO instruction. For details, refer to the following.

(☞ Page 87 Physical address and logical address of random access buffer)

Data Format

The communication data is configured of the header and application data.

Header

The header is for TCP/IP or UDP/IP. The RJ71EN71 automatically adds and deletes the header, so it does not need to be set.

■Details of header section size

The details of the header section data format and size are shown below.

- TCP/IP

Ethernet (14 bytes)	IP (20 bytes)	TCP (20 bytes)

- UDP/IP

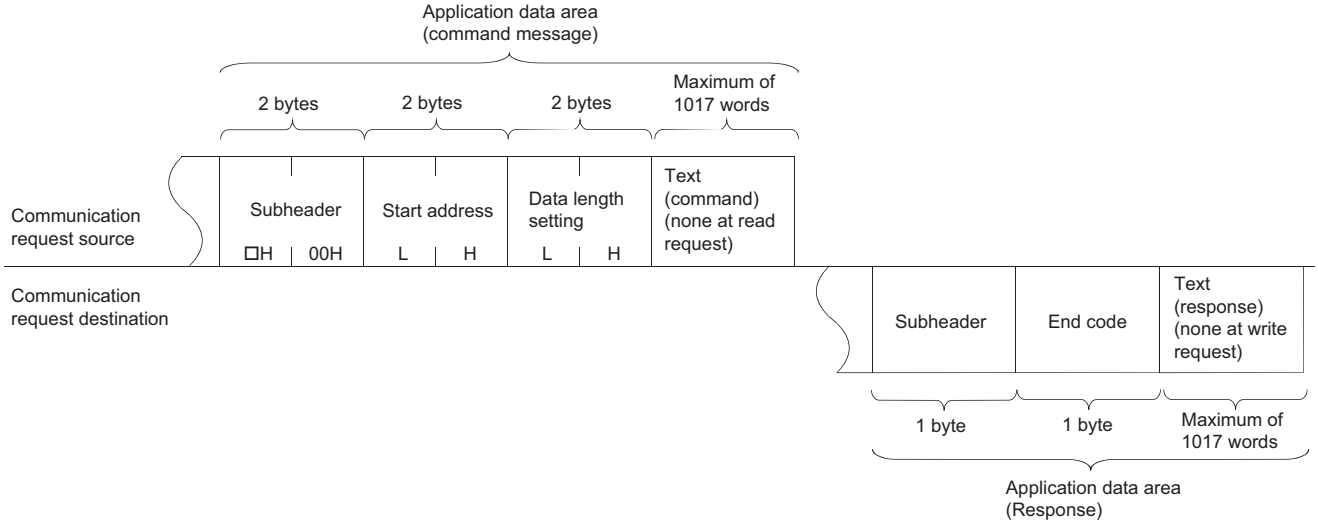
Ethernet (14 bytes)	IP (20 bytes)	UDP (8 bytes)

Application data

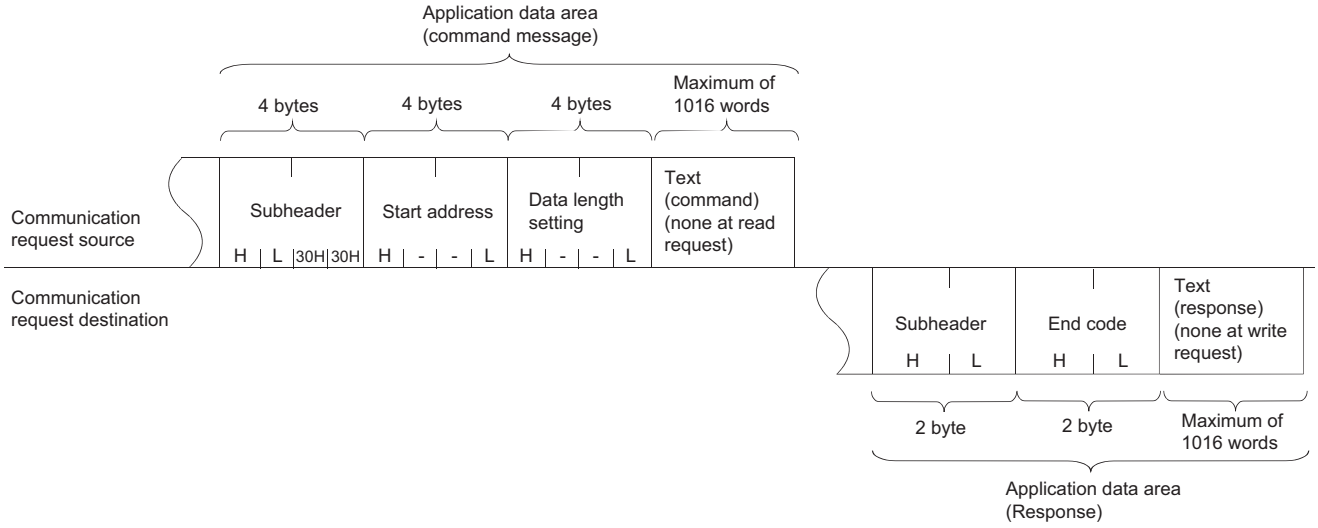
The application data expresses the following data code as binary code or ASCII code. Switch between the binary code and ASCII code with "Own Node Settings" under "Basic Settings". (☞ Page 125 Own Node Settings)

■Format

• When exchanging data with binary codes

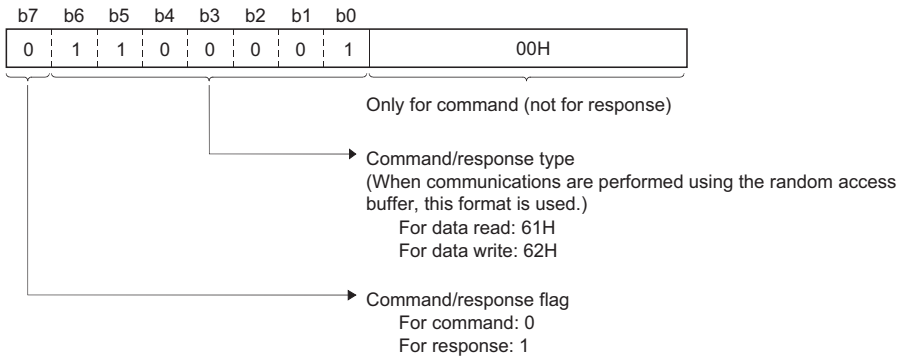


• When exchanging data with ASCII codes

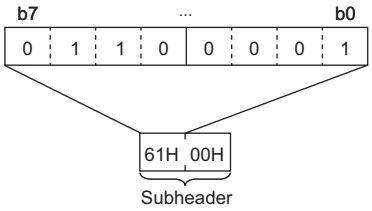
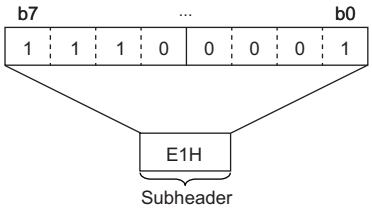
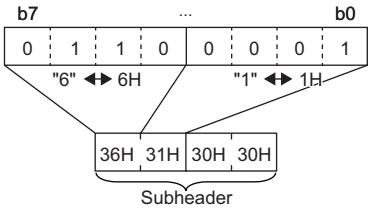
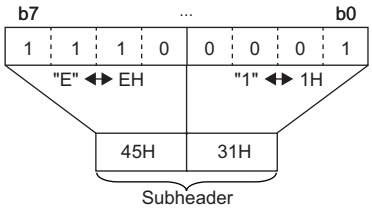


■Subheader

The RJ71EN71 automatically adds and deletes the header, so it does not need to be set.



• During read

Data Format	Command (external device → RJ71EN71)	Response (RJ71EN71 → external device)
Binary code		
ASCII code		

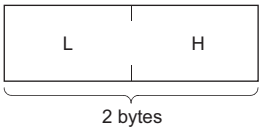
■Start Address

The start address of the random access buffer range where data read/write is executed is expressed as a logical address.

(☞ Page 87 Physical address and logical address of random access buffer)

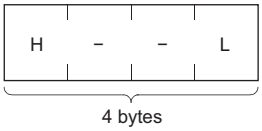
• When exchanging data with binary codes

Specify the head address with a binary value.



• When exchanging data with ASCII codes

Specify the ASCII code for expressing the start address as a hexadecimal.

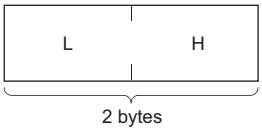


■Data length setting

Express the number of read/write data words with the random access buffer range.

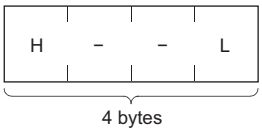
• When exchanging data with binary codes

Specify the number of words as a binary value. (Maximum 1017 words)



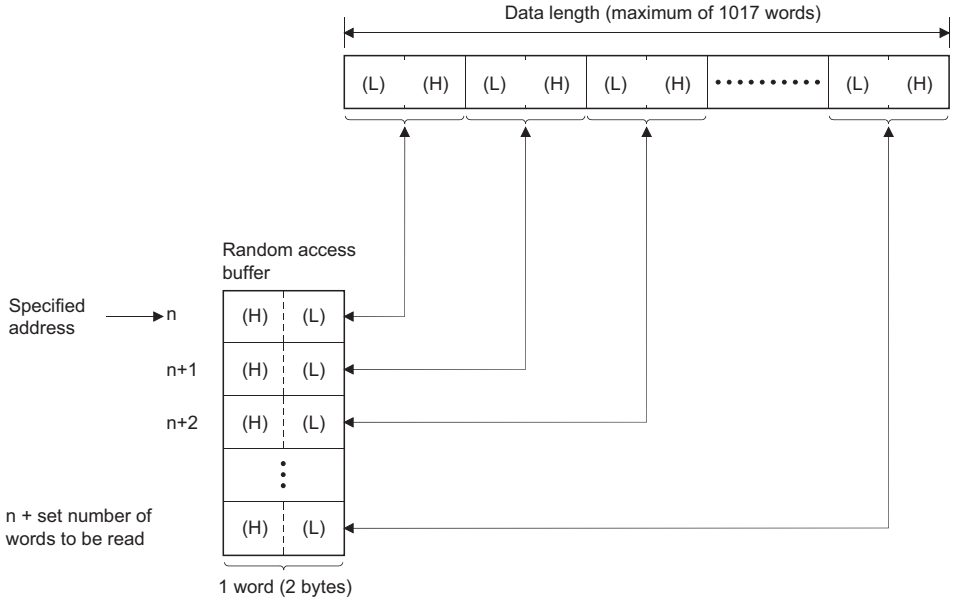
• When exchanging data with ASCII codes

Specify the ASCII code when expressing the number of words as a hexadecimal. (Maximum 508 words)

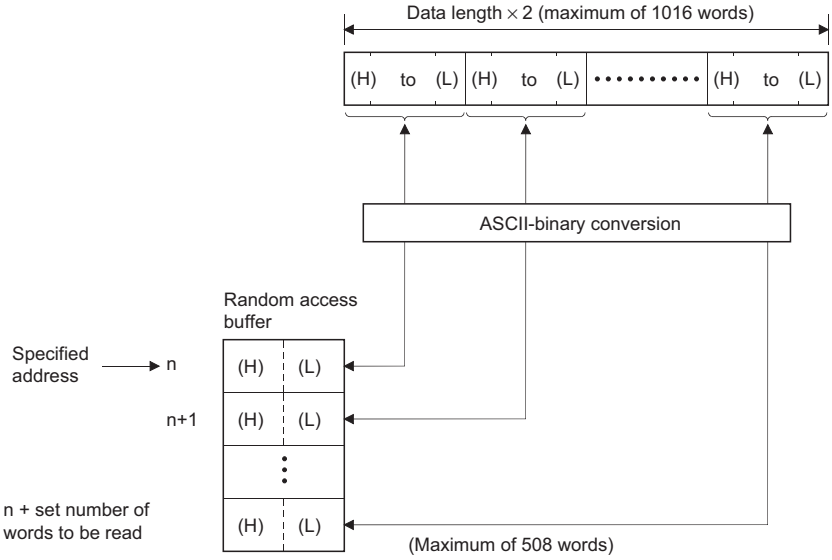


■Text

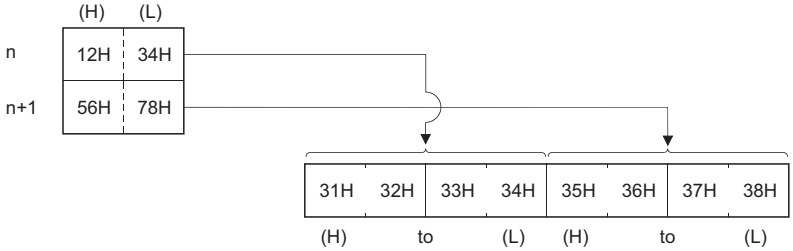
• When exchanging data with binary codes



• When exchanging data with ASCII codes


Data length × 2 (maximum of 1016 words)
(H) to (L) (H) to (L) (H) to (L)
ASCII-binary conversion
Random access buffer
Specified address
n
n+1
n + set number of words to be read
(H) (L)
(Maximum of 508 words)

Ex.



■End code

The error code is stored in the end command added to the response. (☞ Page 186 End Codes Returned to an External Device During Data Communications)

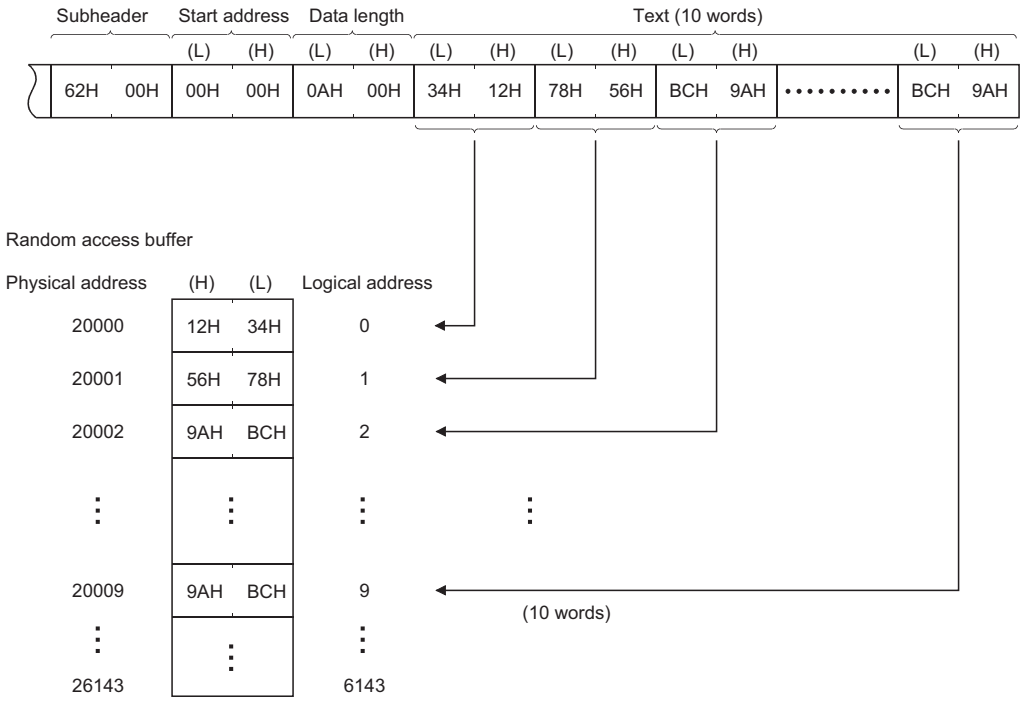
Example of command/response format

The following section shows an example of the command and response format.

■Writing to buffer with write request from external device

• When exchanging data with binary codes

Command format (external device → RJ71EN71)

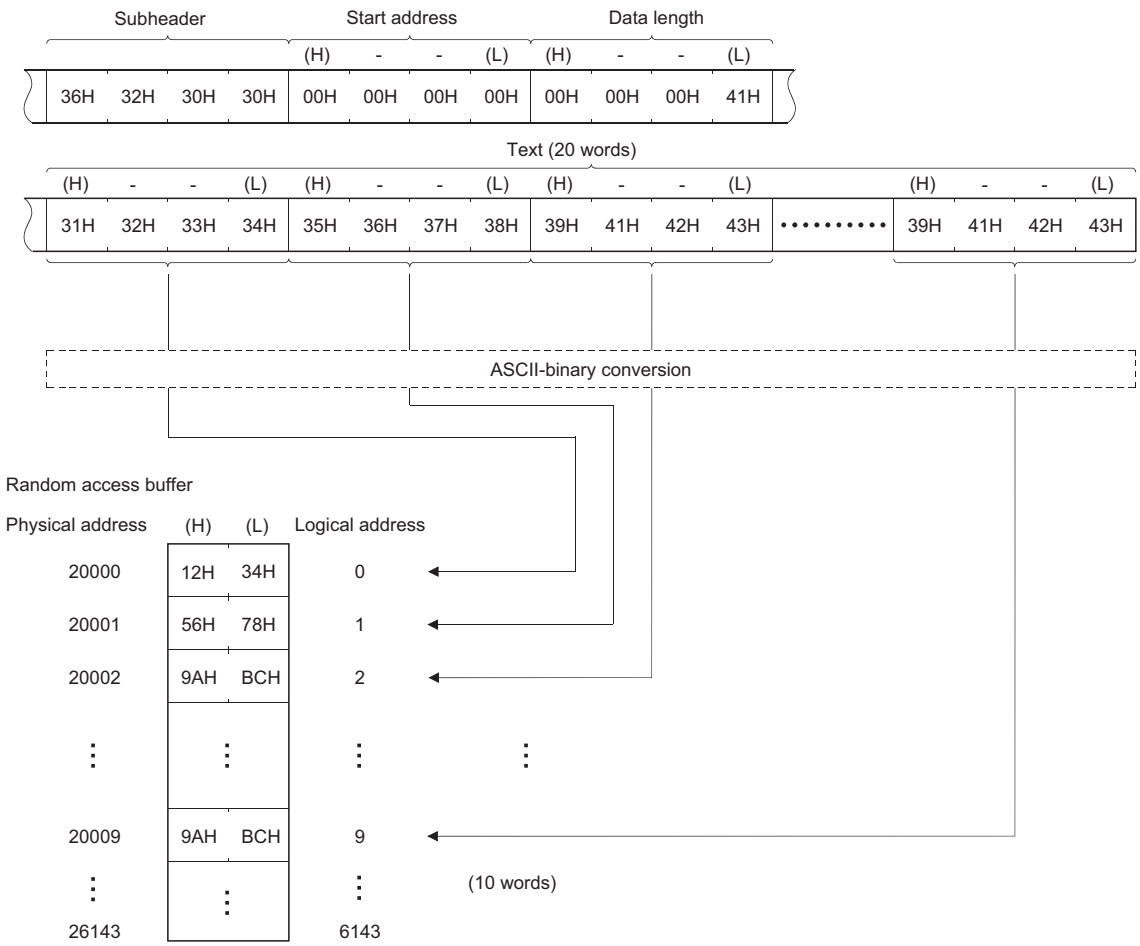

Subheader
Start address
Data length
Text (10 words)
(L) (H) (L) (H) (L) (H) (L) (H) (L) (H) (L) (H)
62H 00H 00H 00H 0AH 00H 34H 12H 78H 56H BCH 9AH BCH 9AH
Random access buffer
Physical address (H) (L) Logical address
20000 12H 34H 0
20001 56H 78H 1
20002 9AH BCH 2
20009 9AH BCH 9
(10 words)
26143 6143

Response format (RJ71EN71 → external device)

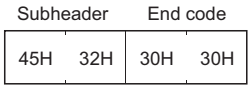
Subheader	End code
E2H	00H

• When exchanging data with ASCII codes

Command format (external device → RJ71EN71)


Subheader
Start address
Data length
(H) - - (L) (H) - - (L)
36H 32H 30H 30H 00H 00H 00H 00H 00H 00H 00H 41H
Text (20 words)
(H) - - (L) (H) - - (L) (H) - - (L) (H) - - (L)
31H 32H 33H 34H 35H 36H 37H 38H 39H 41H 42H 43H 39H 41H 42H 43H
ASCII-binary conversion
Random access buffer
Physical address (H) (L) Logical address
20000 12H 34H 0
20001 56H 78H 1
20002 9AH BCH 2
20009 9AH BCH 9
(10 words)
26143
6143

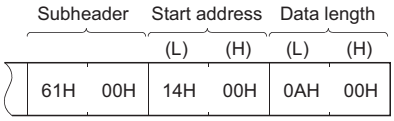
Response format (RJ71EN71 → external device)



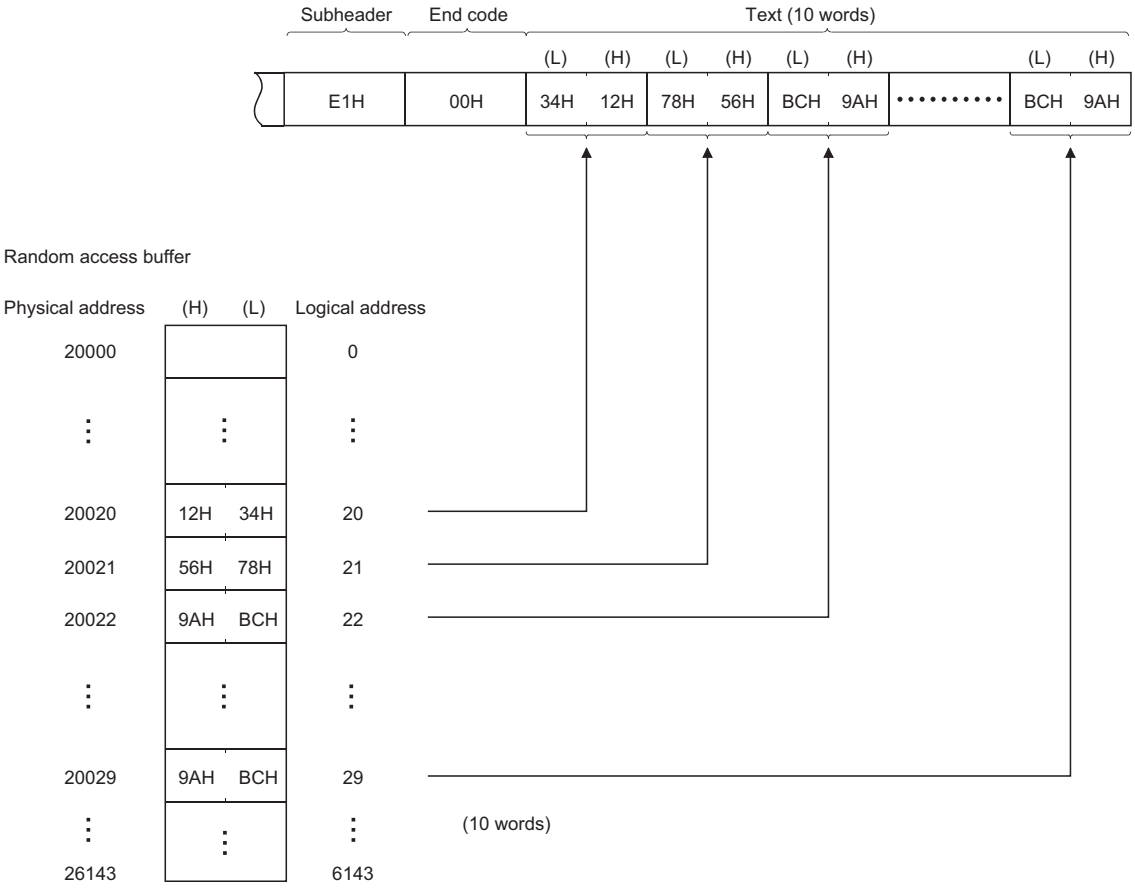
■Reading from buffer with read request from external device

• When exchanging data with binary codes

Command format (external device → RJ71EN71)

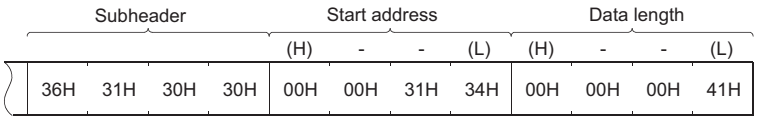


Response format (RJ71EN71 → external device)

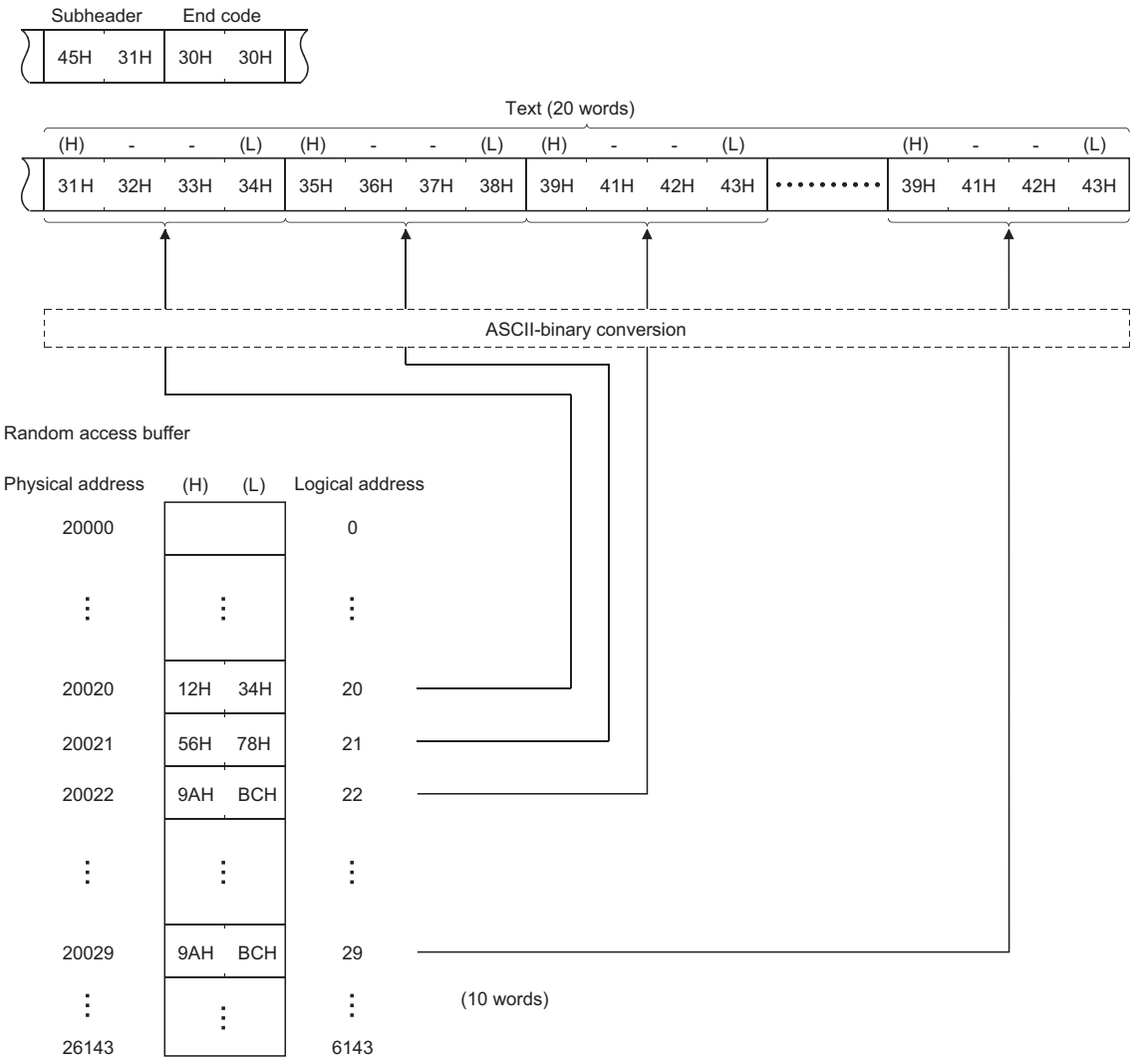


• When exchanging data with ASCII codes

Command format (external device → RJ71EN71)

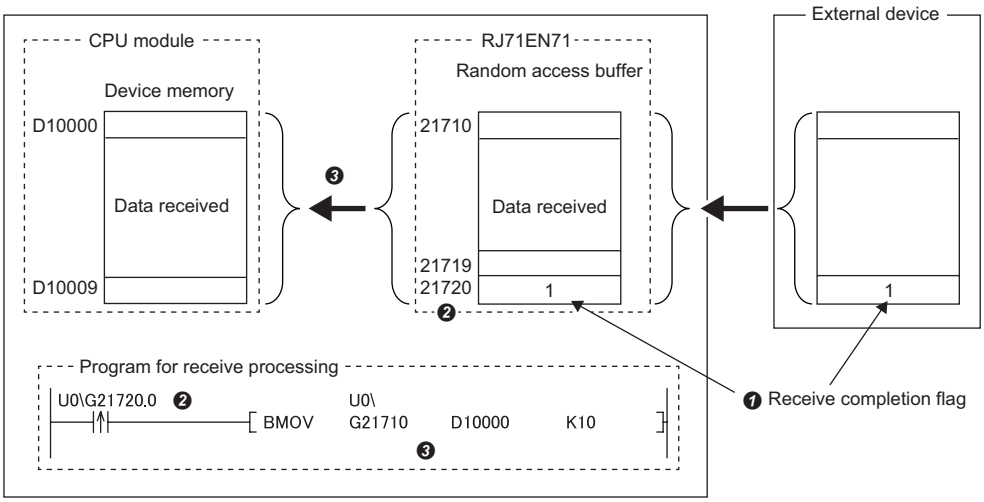


Response format (RJ71EN71 → external device)


Subheader
End code
45H 31H 30H 30H
Text (20 words)
(H) - - (L) (H) - - (L) (H) - - (L) (H) - - (L)
31H 32H 33H 34H 35H 36H 37H 38H 39H 41H 42H 43H 39H 41H 42H 43H
ASCII-binary conversion
Random access buffer
Physical address (H) (L) Logical address
20000 0
20020 12H 34H 20
20021 56H 78H 21
20022 9AH BCH 22
20029 9AH BCH 29
26143 6143
(10 words)

Example of communications with random access buffer

The following figure shows an example of the write operation from the external device.



❶ The receive completion flag is set at the end of the received data.
❷ The receive completion flag is monitored.
❸ When the receive completion flag turns on, the data is transferred from the random access buffer to the CPU module.

1.7 Link Dedicated Instruction Communication

The link dedicated instructions are used to exchange random data between another network or other station's CPU module connected to Ethernet, read/write arbitrary data, and access other stations such as remote RUN/STOP. If the initial processing for the own station, relay station and access station's RJ71EN71 is completed normally, the other station can be accessed with the link dedicated instructions.

This section describes the procedure for accessing a CPU module in another station on the same Ethernet line.

When exchanging data with a different network, refer to the following.

(☞ Page 226 Communications with Different Networks)

Restriction

communications using the link dedicated instruction is not available when the Ethernet function of the CPU module is used.

Applicable dedicated instructions

Shows the link-dedicated instructions used for data communication.

Instruction	Description
SEND	Sends data to another station.
RECV	Reads the receive data from another station. (for main program)
RECVS	Reads the receive data from another station. (for interrupt program)
READ	Reads data from the word device of another station.
SREAD	Reads data from the word device of another station. (with completion device)
WRITE	Writes data in the word device of another station.
SWRITE	Writes data in the word device of another station. (with completion device)
REQ	Requests the remote RUN/STOP to the CPU module on another station.
	Reads/writes clock data from/to another station.
ZNRD	Reads data from the word device in another station (ACPU).
ZNWR	Writes data in the word device in another station (ACPU).

Point

For details on link dedicated instructions, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

Data communication procedures

This section describes the procedure for communication with link-dedicated instructions.

1. After the module parameters are set, check that the RJ71EN71 initial processing has completed normally. ('Initial status' (Un\G1900024.0): On)
2. Data is exchanged with link dedicated instructions.

Point

Communication with the link dedicated instructions uses the MELSOFT connection UDP port, so the open/close processing is not required.

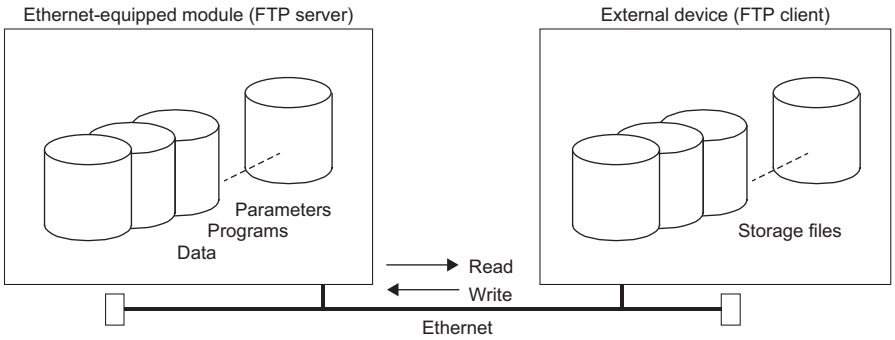
Setting procedure

1. Set the network number and station number in "Own Node Settings" under "Basic Settings". (☞ Page 126 Communications by Network No./Station No.)
2. Set the send destination station information in "Network/Station number <-> IP Related information setting" under "Application Settings". (☞ Page 141 Network/Station No. <-> IP information setting)*1

*1 This setting is not required when specifying the target station with an IP address using the READ instruction, SREAD instruction, WRITE instruction or SWRITE instruction control data.

1.8 File Transfer Function (FTP server)

The server function of FTP (File Transfer Protocol) used to transfer files with the external device is supported. The external device with FTP client function can easily and directly access files in the CPU module.
The following operations can be executed on the CPU module files from the external device with FTP client function.



- Reading of file from CPU module (download)
- Writing of file to CPU module (upload)
- Browsing of file names in CPU module

Point

When using the file transfer function (FTP server) with multi-CPU system configuration, the following CPU module is accessed immediately after logging in. To change the access destination CPU module, execute the cpuchg command.

- Control CPU (when the RJ71EN71 is connected)
- CPU module connected with Ethernet cable (when CPU module is connected)

Data communication procedures

The following section describes the settings for FTP communication.

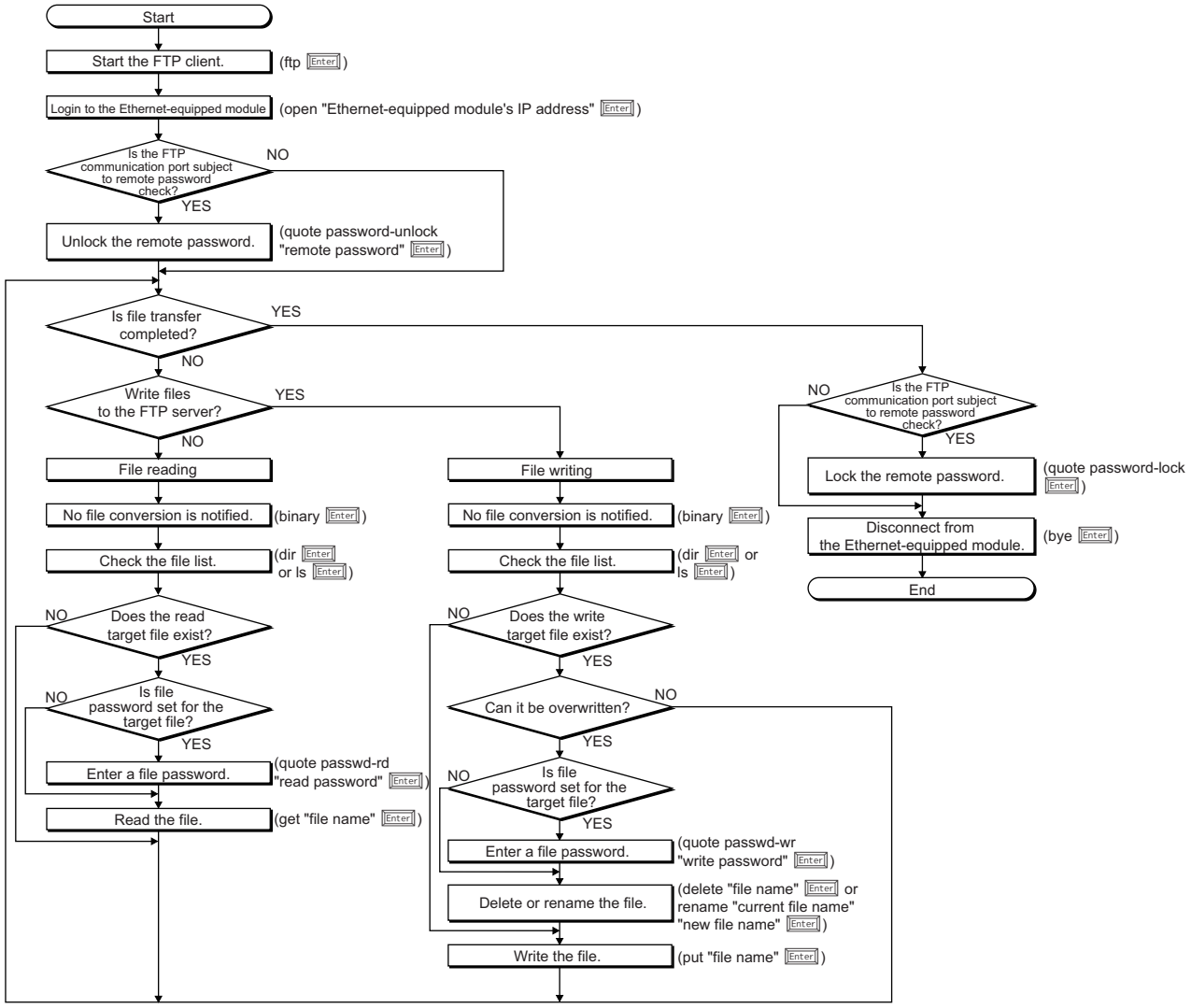
Setting in the Ethernet-equipped module side

To use the file transfer function (FTP server), set "Use" for "FTP Server" in "FTP Server Settings" under "Application Settings".
For details on other setting items, refer to the following.

☞ Page 133 FTP Server Settings

Operations on external device (FTP client) side

This section describes the procedures and required processes on the external device side for using the Ethernet-equipped module's file transfer function (FTP server). The FTP commands and input format used for the operation are shown in the explanation. ("Enter" means to input CR, Enter or the Return key.)

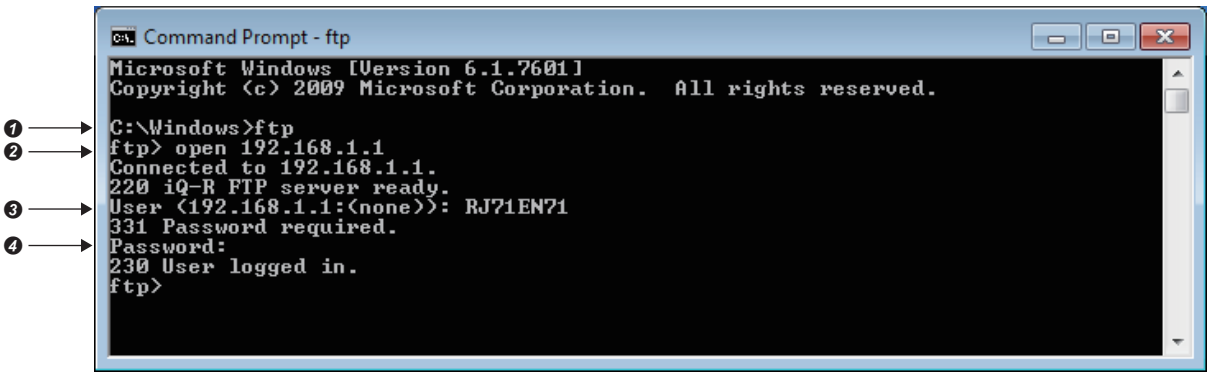


Logging into Ethernet-equipped module

This section describes the steps from starting FTP and logging into the Ethernet-equipped module.

Ex.

Start FTP from the Microsoft® Windows® command prompt.



❶ FTP start (FTP Enter)
❷ Connect with FTP server (open Ethernet-equipped module IP address Enter)
❸ Specify login name (login name Enter)
❹ Specify password (password Enter)

Use the login name and password that are set in "FTP Server Settings" under "Application Settings". When the Ethernet-equipped module (FTP server) receives the login name and password from the external device (FTP client), it checks that the login name and password are correct.

If the login name and password are correct, transfer of the files to the Ethernet-equipped module is permitted. If incorrect, file transfer is not permitted.

Locking and unlocking the remote password

If the FTP communication port is specified as a remote password check target with the remote password setting, unlock the remote password with the following command. (quote password-unlock remote password Enter) When finished, lock the remote password with the following command. (quote password-lock Enter)

Point

If the FTP communication port is specified as a remote password check target, some commands cannot be used until the remote password is unlocked.

For details on the commands that can be used in the locked state, and those that can only be used in the unlock state, refer to the following.

(☞ Page 102 FTP command list)

Inputting the file password

If a file password is set for the target file, the file password must be input with the following command before the file can be accessed.

- Write password (quote passwd-wr write password Enter)
- Read password (quote passwd-rd read password Enter)

Files that can be transferred with FTP

The files that can be transferred (read, write, deleted) with the file transfer function (FTP server) are shown below.

○: Transfer possible, △: Transfer possible only when CPU module is in STOP state, ×: Transfer not possible

File type	CPU built-in memory									Memory card			Extension
	Program memory			Device/label memory			Data memory			SD memory card			
	Drive 0			Drive 3			Drive 4			Drive 2			
	Write	Read	Delete	Write	Read	Delete	Write	Read	Delete	Write	Read	Delete	
Program	×	×	×	×	×	×	×	×	×	△	○	△	.PRG
FB file	×	×	×	×	×	×	×	×	×	△	○	△	.PFB
CPU parameter	×	×	×	×	×	×	△	○	△	△	○	△	.PRM
System parameter	×	×	×	×	×	×	△	○	△	△	○	△	
Module parameter	×	×	×	×	×	×	△	○	△	△	○	△	
Module extension parameter	×	×	×	×	×	×	△	○	△	△	○	△	.PRM, .PPR
Memory card/ parameter	×	×	×	×	×	×	×	×	×	△	○	△	.PRM
Device comment	×	×	×	×	×	×	○	○	△	○	○	△	.DCM
Device default value	×	×	×	×	×	×	×	×	×	×	×	×	.DID
Global label setting file	×	×	×	×	×	×	×	×	×	×	×	×	.IFG
Label default value	×	×	×	×	×	×	×	×	×	×	×	×	.LID
Restoration information	×	×	×	×	×	×	○	○	○	○	○	○	.CAB
File register	×	×	×	○	○	△	×	×	×	○*1	○	△	.QDR
Event history	×	×	×	×	×	×	×	×	×	×	×	×	.LOG
Device data storage file	×	×	×	×	×	×	×	×	×	×	×	×	.QST
General-purpose data	×	×	×	×	×	×	○	○	○	○	○	○	Arbitrary
Logging setting file (Common setting file)	×	×	×	×	×	×	×	×	×	○	○	○	.LCS
Logging setting file (Individual setting file)	×	×	×	×	×	×	○	○	○	○	○	○	.LIS
Remote password	×	×	×	×	×	×	×	×	×	×	×	×	.SYP

*1 The written file cannot be run as a function.

FTP command

FTP command list

The FTP client side commands supported by the Ethernet-equipped module are shown below.

○: Executable[*1], ×: Not executable[*2]

Command	Function	CPU module status			Remote password	
		STOP	RUN		Unlocked[*4]	Locked[*4]
			Enable[*3]	Disable[*3]		
binary[*5]	Notifies that the file will be transferred without conversion.	○	○	○	○	×
bye	Closes and ends the connection with the FTP server.	○	○	○	○	○
close	Closes the connection with the FTP server.	○	○	○	○	○
delete	Deletes the CPU module file.	○	○[*6]	×	○	×
dir	Displays the CPU module file information.	○	○	○	○	×
get	Reads a file from the CPU module.	○	○	○	○	×
ls	Displays the CPU module file name.	○	○	○	○	×
mdelete	Deletes the CPU module file.	○	○[*6]	×	○	×
mdir	Stores the CPU module file information in the file.	○	○	○	○	×
mget	Reads a file from the CPU module.	○	○	○	○	×
mls	Stores the CPU module file name in the file.	○	○	○	○	×
mput	Writes the file to the CPU module.	○	○	×	○	×
open	Connects to the FTP server.	○	○	○	○	○
put	Writes the file to the CPU module.	○	○	×	○	×
pwd	Displays the current directory of the CPU module.	○	○	○	○	×
quit	Closes and ends the connection with the FTP server.	○	○	○	○	○
quote	Sends the FTP server's subcommand.[*7]	○	○	○	○	○
rename	Changes the CPU module file name.	○	○	×	○	×
user	Inputs the user name and password for the Ethernet-equipped module.	○	○	○	○	○

*1 The command may not be executed depending on the file type. (☞ Page 101 Files that can be transferred with FTP)

*2 If executed, the process completes abnormally.

*3 Shows the "Allow Online Change" setting in "FTP Server Setting" under "Application Settings". If an illegal command is executed while write is prohibited during RUN, the process completes abnormally.

*4 Shows whether the command can be executed when the FTP communication port is specified as a remote password check target port with the Ethernet-equipped module mounted station's remote password setting. For details on the remote password, refer to the following.
(☞ Page 114 Remote password)

*5 The Ethernet-equipped module is set to transfer the file automatically without conversion. (Binary code fixed)
Therefore, the file is transferred with binary code regardless of the "Communication Data Code" setting in "Own Node Settings" under "Basic Settings".

*6 The parameter file and program file cannot be deleted when the CPU module is in the RUN state.

*7 Only the subcommands dedicated for the Ethernet-equipped module can be used. For the subcommands can be used, refer to the following.
(☞ Page 103 Subcommands usable with quote command)

■Subcommands usable with quote command

This section describes the Ethernet-equipped module dedicated commands added to the quote command and used.

When executing this command from the FTP client, input the subcommand after the quote command.

("Enter" means to input CR, Enter or the Return key.)

Ex.

Executing the STOP command

Input the following at the command prompt.

quote stop Enter

The following table lists the subcommands can be used.

○: Executable, ×: Not executable*1

Command	Function	CPU module status			Remote password	
		STOP	RUN		Unlocked	Locked
			Write enable	Write prohibit		
change	Shows or changes the CPU module file attributes.	○	○	×	○	×
cpuchg*2	Specifies the access destination CPU module when using a multi-CPU system configuration.	○	○	○	○	×
passwd-rd	Sets, shows or clears the file password (read password).	○	○	○	○	×
passwd-wr	Sets, shows, or clears the file password (write password).	○	○	○	○	×
password-lock	Changes the remote password from the unlock state to the lock state.	○	○	○	○	×*4
password-unlock	Changes the remote password from the lock state to the unlock state.	○	○	○	○	○
status	Displays the CPU module operation information.	○	○	○	○	×
run	Sets the CPU module to the RUN state.	○*3	○	○	○	×
stop	Sets the CPU module to the STOP state.	○	○	○	○	×
pm-write	Writes the program memory.	○	×	×	○	×

*1 If executed, the process completes abnormally.
*2 This subcommand cannot be used when the connection destination is a CPU module.
*3 This subcommand is invalid when the RUN/STOP/RESET switch of the CPU module is set to STOP.
*4 Even if the subcommand is executed, the remote password remains locked with no error occurred.

Specifying an FTP command

This section describes the method of specifying the files specified with the FTP command on the FTP client (external device side) supported by the Ethernet-equipped module.

With the CPU module, the drive name and file name are distinguished when specifying the file. *1

When specifying a file in the CPU module with FTP, specify the target file with the following arrangement.

Item	Description
Specification format	[Drive name:\]Folder name*2\File name.Extension
Example	3:\MAINSEQ1.QDR (other than drive 2) 2:\LOGGING\LOG01\00000001\LOG01_00000001.CSV (drive 2)
Specification details	Refer to the following. ☞ Page 103 Drive name (drive No.),Page 104 Folder name, file name, and extension

*1 Use "\" as the delimiter.
*2 The file name can be specified only when specifying a file stored in drive 2.

Point

The section enclosed in square brackets [ ] in the specification format can be omitted.

■Drive name (drive No.)

Specify the drive name of the target memory for transferring the file.

For the correspondence of the CPU module target memory and drive names, refer to the following.

(☞ Page 101 Files that can be transferred with FTP)

Omitting the drive name is the same as specifying the program memory (drive 4).

■Folder name, file name, and extension

- Specify the folder name and file name according to the rules provided in the following manual.

📖MELSEC iQ-R CPU Module User's Manual (Application)

- The name determined for the CPU module is assigned for the extension. (☞ Page 101 Files that can be transferred with FTP)
- When using a FTP command that can be used for multiple files, specify the file name and extension with the wild card "*" or "?". (Depending on the FTP client, there may be additional restrictions to the characters that can be used for the file name)

: All files with the arbitrary character string (including none) are targeted from the position specified with "".

?: All files with the arbitrary character string (excluding none) are targeted from the position specified with "?". ("?" can be used multiple times.)

Details of FTP command

This section describes the FTP commands on the FTP client side supported by the Ethernet-equipped module, and the methods of using those commands.

Point

- Note that depending on the client side FTP application, some of the FTP commands may not operate as described in this manual. Refer to the manual for the FTP client, and check the functions, operation methods, and so on.
- The section enclosed in square brackets [ ] in the specification format can be omitted.

■FTP server support command

Command name	Description	
binary	Function	Notifies the FTP server that the file will be transferred without conversion. The return code and kanji codes are also not converted. These settings are automatically applied to the Ethernet-equipped module.
	Specification format	binary (abbreviated: bin)
bye	Function	Closes the connection with the FTP and quits the FTP.
	Specification format	bye
	Same function	quit
close	Function	Closes the connection with the FTP server.
	Specification format	close
delete	Function	Deletes files stored in the CPU module.
	Specification format	delete "file path name"
	Example	When deleting files stored in the SD memory card delete 2:\MAINSEQ1.PRG
	Similar command	mdelete
dir	Function	Displays the file name, date of creation and volume of files stored in the CPU module.
	Specification format	dir [drive name:\]
	Example	When displaying the detailed information of files stored in the data memory dir 4:\
	Similar command	ls
get	Function	Reads a file from the CPU module.
	Specification format	get "source file path name" [destination file path name]
	Example 1	When reading files stored in the SD memory card and store with same file name get 2:\MAINSEQ1.PRG
	Example 2	When reading files stored in the SD memory card and store with different file name get 2:\SEQ1BAK.PRG\SEQ\SEQ10LD.PRG
	Caution	• If the destination file path name (FTP client side) is not specified, the file is stored in the FTP client side with the same file name as the source file name (CPU module side). • The transfer destination is in the currently connected directly when FTP is started and connected.
ls	Function	Displays the names of files stored in the CPU module.
	Specification format	ls [drive name:\]
	Example	When displaying the detailed information of files stored in the data memory ls 4:\
	Similar command	dir

Command name	Description	
mdelete	Function	Deletes files stored in the CPU module. When deleting multiple files, specify the file name and extension in the file path name with wild cards (*, ?).
	Specification format	mdelete "file path name" (abbreviated: mdel)
	Example	When deleting all files with "CSV" extension from files stored in SD memory card mdelete 2:*.CSV
	Similar command	delete
mdir	Function	Stores the detailed information (file name, date of creation, volume) of the file stored in the CPU module in the FTP client side file as log data.
	Specification format	mdir "source drive name":\"destination file path name"
	Example	When storing the detailed information of file stored in data memory into 20120702.LOG file mdir 4:\20120702.LOG
	Caution	• Always specify "\" immediately after the source drive name. • Always specify the source drive name when specifying the destination file path name (FTP client side). • If the destination file path name is not specified, the file is stored with the file name determined by the FTP client's FTP application. • The transfer destination is in the currently connected directly when FTP is started and connected.
	Similar command	mls
mget	Function	Reads a file from the CPU module. When reading multiple files, specify the file name and extension in the file path name with wild cards (*, ?). When reading multiple files, receive is confirmed before transferring each file.
	Specification format	mget "file path name"
	Example	When reading all files with "CVS" extension from files stored in SD memory card mget 2:*.CSV
	Caution	• The read file is stored with the same file name in the FTP client side. The storage destination is in the current connection directory when the FTP is started and connected.
mls	Function	Stores the file name of the file stored in the CPU module in the FTP client side file as log data.
	Specification format	mls "source drive name":\"destination file path name"
	Example	When storing the file name of file stored in SD memory card into 20120702.LOG file mls 2:\20120702.LOG
	Caution	• Always specify "\" immediately after the source drive name. • Always specify the source drive name when specifying the destination file path name (FTP client side). • If the destination file path name is not specified, the file is stored with the file name determined by the FTP client's FTP application. • The transfer destination is in the currently connected directly when FTP is started and connected.
	Similar command	mdir
mput	Function	Writes the file to the CPU module. When writing multiple files, specify the file name and extension in the file path name with wild cards (*, ?). When writing multiple files, send is confirmed before transferring each file.
	Specification format	mput "source file path name"
	Example	When writing all files with "PRG" extension mput*.PRG
	Caution	• The storage destination file name is the same as the FTP client side. • The transmission destination is the data memory (drive 4 "4:\").
open	Function	Specifies the host name or IP address and port number on the FTP server side, and connects with the FTP server.
	Specification format	open "host name" [port number] open "IP address" [port number] • Host name: Host name set with Microsoft® Windows® hosts file • IP address: IP address of the Ethernet-equipped module side • Port number: Port number to be used (If omitted, port number 21 is used for operation)
	Example 1	When specifying the host name and connecting to the FTP server open HOST
	Example 2	When specifying the IP address and connecting to the FTP server open 192.0.1.254
	Caution	The IP address can be specified to create a connection when starting the FTP.

Command name	Description	
put	Function	Writes the file to the CPU module.
	Specification format	put "source file path name" [destination file path name]
	Example 1	When writing the param.PRM file to the SD memory card with the same file name put param.PRM 2:\param.PRM
	Example 2	When writing the param.PRM file to the SD memory card with a different file name put param.PRM 2:\param1.PRM
	Caution	• If the directory is not specified with the source file path name (FTP client side), the file in the current connection directory when the FTP server is started and connected is written. • If the destination file path name (FTP server side) is not specified, the file is transferred to the data memory (drive 4 "4:\").
pwd	Function	Displays current directory name of the CPU module.
	Specification format	pwd
	Caution	"\" is displayed as the pwd command execution results.
quit	Function	Closes the connection with the FTP and quits the FTP.
	Specification format	quit
	Similar command	bye
quote	Function	Sends the FTP server's subcommand (Ethernet-equipped module dedicated subcommand).
	Specification format	quote
	Example	quote password-lock
	Caution	Only the Ethernet-equipped module dedicated subcommand can be specified. Refer to the following. (☞ Page 107 Ethernet-equipped module dedicated subcommand)
rename	Function	Changes the CPU module file name.
	Specification format	rename "old file path name" "new file path name" (abbreviated: ren)
	Example	When changing the name of a file stored in the SD memory card rename 2:\param.PRM 2:\param1.PRM
	Caution	The following response code appears when the file is successfully renamed. 350 Need more info. 250 Rename successful.
user	Function	Inputs the user name and password for the connected FTP server.
	Specification format	user "user name" [FTP password] • User name: Login name set with Ethernet-equipped module parameters • FTP password: FTP password set with Ethernet-equipped module parameters
	Example 1	When specifying the user name user RJ71EN71
	Example 2	When specifying the user name and password user RJ71EN71 RJ71EN71

■Ethernet-equipped module dedicated subcommand

This section describes the Ethernet-equipped module dedicated subcommands that are added to the FTP command's quote command and sent.

Command name	Description	
change	Function	Shows or changes the attributes of files stored in the CPU module.
	Specification format 1	When displaying the file attributes quote change file path name One of the following is displayed as the execution results when the process ends normally. • When specified file is read-only: -----R • When specified file is writable and readable: -----W
	Specification format 2	When changing the file attributes quote change "file path name" "attribute" Specify the attributes with one of the following methods. • When changing to a read-only file: r • When changing to a writable and readable file: w
	Example 1	When displaying the attributes of files stored in the SD memory card quote change 2:\PRG1.PRG
	Example 2	When changing the attributes of files stored in the SD memory card quote change 2:\PRG1.PRG r
cpuchg	Function	Specifies the access destination CPU module when using a multi-CPU system configuration. This may also display the current access destination CPU module.
	Specification format	quote cpuchg [access destination CPU module] Access destination CPU module: Specify the CPU module from which files are to be accessed. Shows the method for specifying the access destination CPU module. • No input: Checks the current access destination CPU module. • controlPLC: Specifies the control CPU as the access destination CPU module. • no1: Specifies the CPU No.1 as the access destination CPU module. • no2: Specifies the CPU No.2 as the access destination CPU module. • no3: Specifies the CPU No.3 as the access destination CPU module. • no4: Specifies the CPU No.4 as the access destination CPU module. The execution results when the access is completed normally are shown in the following manner. • When setting access destination CPU module: 200 Command Okey • When displaying access destination CPU module: 200 Target cpu is "access destination CPU module". The following appears if the specified access destination CPU module is not found. • 557 Cpu not found
	Example 1	When specifying control CPU as access destination CPU module quote cpuchg controlPLC
	Example 2	When displaying the currently set access destination CPU module quote cpuchg
	Caution	The access destination CPU module after logging into the RJ71EN71 with the open/user command is the RJ71EN71 control CPU.
passwd-rd	Function	Sets the read password (file password) registered as the file transfer target file to the Ethernet-equipped module. Shows/clears the read password set in FTP. Use this command only when a read password is registered for the file transfer target file. The CPU module checks the password when accessing the specified file.
	Specification format	quote passwd-rd [read password] The following appears as the execution results when the command ends normally. • When setting a read password: 200 Command successful • When displaying the read password: 200 Read-password is "read password" • When clearing the read password: 200 Command successful • When displaying the state with a read password not set: 200 Read-password is not set.
	Example 1	When specifying the read password (ABCD1234@efgh) quote passwd-rd ABCD1234@efgh
	Example 2	When displaying the read password currently set in FTP quote passwd-rd
	Example 3	When clearing the read password currently set in FTP quote passwd-rd c, or quote passwd-rd C
	Caution	• One read password can be set for the Ethernet-equipped module's FTP. When the file transfer target file changes and when a read password is registered for the change destination file, reset the read password for the target file. • The read password is initialized (cleared) when logging into the Ethernet-equipped module.

Command name	Description	
passwd-wr	Function	Sets the write password (file password) registered in the file transfer target file to the Ethernet-equipped module. Shows/clears the write password set in FTP. Use this command only when a write password is registered for the file transfer target file. The CPU module checks the password when accessing the specified file.
	Specification format	quote passwd-wr [write password] The following appears as the execution results when the command ends normally. • When setting the write password: 200 Command successful • When displaying the write password: 200 Write-password is "Write password" • When clearing the write password: 200 Command successful • When displaying the state with the write password not set: 200 Write-password is not set.
	Example 1	When specifying the write password (ABCD1234@efgh) quote passwd-wr ABCD1234@efgh
	Example 2	When displaying the write password currently set in the FTP quote passwd-wr
	Example 3	When clearing the write password currently set in the FTP quote passwd-wr c, or quote passwd-wr C
	Caution	• One write password can be set for the Ethernet-equipped module's FTP. When the file transfer target file changes and when a write password is registered for the change destination file, reset the write password for the target file. • The write password is initialized (cleared) when logging into the Ethernet-equipped module.
password-unlock	Function	Specifies the remote password set for the CPU module and unlocks the password. This command is used when FTP communication port is specified as a remote password check target port.
	Specification format	quote password-unlock [remote password] • Remote password: Specifies the remote password set in the CPU module parameters. The following appears as the execution results when the command ends normally. 200 Command Okey The following appears when the remote password does not match. 556 Password Error The following appears if another command is requested before the remote password is unlocked. 555 Password Locked
	Example	When specifying a remote password (123456) quote password-unlock 123456
	Caution	• If the FTP communication port is specified as a remote password check target port when logging in, the password will be locked. • The CPU module files can be accessed by executing this command and unlocking before starting the various FTP operation. • If the FTP communication port is not specified as a remote password check target port, the processing will complete normally when the remote password is unlocked.
password-lock	Function	Locks the remote password function set for the CPU module. This command is executed when the FTP communication port is specified as a remote password check target port.
	Specification format	quote password-lock The following appears as the execution results when the command ends normally. 200 Command Okey
	Example	When locking the remote password quote password-lock

Command name	Description	
run	Function	Sets the CPU module to the RUN state (remote RUN). Clearing of the device memory can be specified when entering the RUN state.
	Specification format	quote run [mode [clear mode]] Mode: Specify whether to forcibly execute remote RUN • 0: Normal RUN (default) • 1: Forced RUN Clear mode: Specify to clear (initialize) CPU module device memory at start of operation during remote RUN • 0: Do not clear device (default) • 1: Clear other than latch area • 2: Clear all including latch range The following message appears as the execution results when the process ends normally. 200 Command successful
	Example 1	When executing the remote RUN with normal RUN and do not clear device memory specified quote run
	Example 2	When executing the remote RUN with forced RUN and do not clear device memory specified quote run 1
	Example 3	When executing the remote RUN with forced RUN and clear other than latch area memory specified quote run 11
	Caution	• Forced RUN is used only when CPU module remote RUN is not possible due to trouble in the device that remote STOPPED the CPU module, and the CPU needs to be forcibly remote RUN with another device. With normal RUN, a CPU module that is in the STOP/PAUSE state by another device cannot be set to the RUN state. • Specify clearing of the device memory by the clear mode at the start of operation according to the system specifications. After the specified clear is executed, the CPU module will RUN according to the device's default settings.
status	Function	Displays the CPU module operation information. This command is used to check the CPU module's operation information when transferring files to the CPU module.
	Specification format	quote status One of the following is displayed as the execution results when the process ends normally. When CPU module is in RUN state: "RUN" When CPU module is in STOP state: "STOP" When CPU module is in PAUSE state: "PAUSE"
stop	Function	Set the CPU module to the STOP state (remote STOP).
	Specification format	quote stop The following message appears as the execution results when the process ends normally. 200 Command successful
	Caution	Write to the program memory after setting the CPU module to the STOP state with this command.
pm-write	Function	Transfers the files written in the program cache memory to the program memory so that the files are held even at power-off.
	Specification format	quote pm-write The following message appears as the execution results when the process ends normally. 200 Command successful
	Caution	• The MELSEC iQ-R series CPU module automatically transfers the files to program memory after writing them in the program cache memory. Therefore, the files are held at power-off without using this command. If this command is used in the FTP client program, the program does not need be modified when replacing the MELSEC-Q series. • Set the CPU module to the STOP state before writing.

Precautions

Precautions for designing system

Design the system (such as configuration of interlock circuits in the program) so that the entire system always functions properly during file transfer to the operating system and during status control of the programmable controller.

FTP client

- The FTP command specifications may differ from this manual depending on the FTP client. In this case, refer to the manual for the FTP client and check the functions and operation methods.
- FTP operations are not possible from Microsoft® Internet Explorer®. If attempted, Internet Explorer® will issue an error.
- Specify the IP address for the FTP command without zero fill. (Do not set "1" as "001".)

Processing on CPU module side

- Only the drive of the CPU module on the own station can access files.
- Do not power off or reset it, or insert/eject the SD memory card during file access. The file could be damaged if these are attempted.
- Do not manipulate the files from a peripheral, such as an engineering tool, while accessing the files. (This also applies to online operations such as writing during RUN as the files are manipulated.) If the file is manipulated from another device during the file transfer function (FTP server) operation, the peripheral may issue an error. If the processing has been halted due to an error, re-execute the processing before quitting the FTP function.

Communication processing

- If a timeout error occurs during file transfer, the TCP/IP connection will be closed. Log into the Ethernet-equipped module with the FTP client again before resuming file transfer.
- The existence of the external device is checked with the FTP connection.
- The file transfer processing time will differ according to the Ethernet line's load rate (line congestion), the number of connections being used simultaneously (other connection's communication processing), and system configuration (distance between FTP server and FTP client, method of accessing CPU module).
- Only one external device (FTP client) can log into the Ethernet-equipped module at one time. If a connection is attempted from another FTP client in the login state, an error will occur without establishing the connection.
- If another communication function is simultaneously executed with DUP/IP during file transfer with FTP, a timeout error and others may occur. Either communicate after the file is transferred, or communicate with TCP/IP.

Writing files

- Files cannot be written over existing files and saved. Write the file after deleting the existing file with the file delete command (delete, mdelete), or renaming with the file rename command (rename).
- Files with read-only attributes and files that are locked from a function other than FTP cannot be written. A write error will occur if attempted.
- The write files cannot be transferred if the SD memory card is write-protected. A write error will occur if attempted.
- A temporary file (FTP_I***_#.TMP) is automatically created when writing the file. (*** is first three digits of start I/O number, # is the hardware port number to which FTP client is connected) The file is changed to the write target file name when the work is completed, but if the power is turned off or reset during file write, the temporary file for work may be saved. In this case, delete it with the file delete command (delete, mdelete).
- If the file register is set to the refresh device, do not write or delete that drive.
- When writing a large file to the SD memory card, enter the STOP state first. A communication error may occur if writing is attempted in the RUN state.
- The number of files that can be written into the specified drive is maximum [maximum number of files that can be written to CPU module] - 1 file. For details on the maximum number of files that can be written to the CPU module, refer to the following. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

Deleting files

- Decide the timing for deleting the files for the entire system including the CPU module and engineering tool.
- Files with read-only attributes and files that are locked by a function other than FTP cannot be deleted. An error will occur if attempted.
- The file cannot be deleted if the SD memory card is protected. An error will occur if attempted.

FTP password

The FTP password can be reset with the following procedure when it is lost.

1. Read the parameters from the CPU module with the engineering tool.
2. Click the [Restore the Default Settings] button in "Application Settings" to return all "Application Settings" to the default values.
3. Set the "FTP Server Settings" and "Application Settings" again.
4. Write the set parameters to the CPU module.
5. Enable the parameters by powering off and on or resetting the CPU module.

Point

When the FTP password is lost, all items set in "Application Settings" must be reset in addition to the "FTP Server Settings".

Setting a firewall on the FTP client side

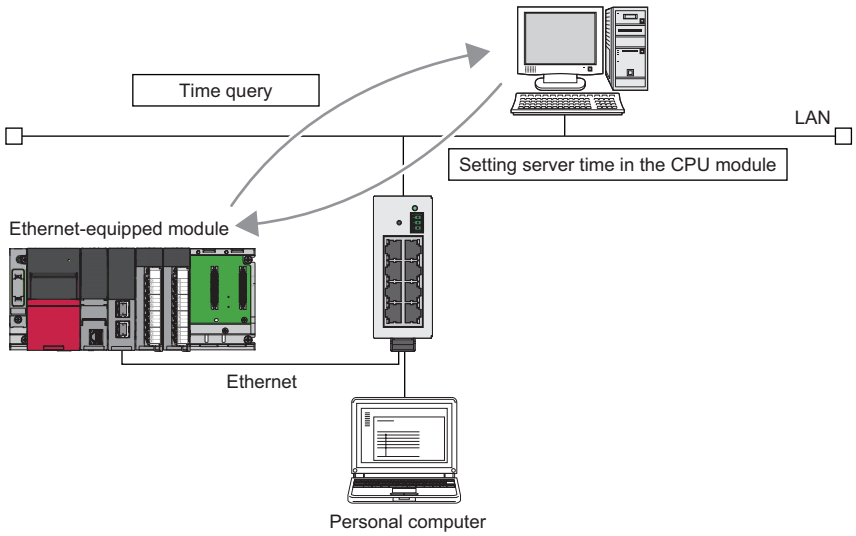
If the FTP communication is blocked by a firewall on the FTP client side, data cannot be exchanged from the FTP server. Check the firewall settings, enable FTP communication and then access the FTP server.

Monitoring timer

When operation of files such as program (.PRG) and FB file (.PFB) is performed in a CPU module with a large program capacity, a timeout may occur due to long processing time on the CPU module. If a timeout occurs, increase the response monitoring timer value. (☞ Page 134 Response Monitoring Timer)

1.9 Time Setting Function (SNTP Client)

Time information is collected from the time information server (SNTP server) connected on the LAN at the specified timing, and the CPU module's time is automatically set.



Restriction

This setting is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".

Point

An SNTP server (time information server) must be provided on the LAN line to use this function.

Time setting execution timing

Time setting is executed in the following timing.

- At powering off and on resetting the CPU module
- At each set time (execution at set cycle interval)
- At set time (execution at set time)
- At programmed arbitrary timing*1

*1 The time is set when 'Time setting function (SNTP client) execution' (Un\G11009.0) is turned on.

Point

When setting the time at the CPU module power on or reset, check the hub or external device connection before setting.

Setting procedure

Set with "Time Setting (SNTP client)" under "Application Settings". (☞ Page 134 Time Setting)

Confirming the execution results

The time setting execution results can be checked with the following module label.

- 'Operation result' (Un\G11000)
- 'Execution time' (Un\G11001 to Un\G11007)
- 'Required response time' (Un\G11008)

Precautions

■Time to be set

The time to be set in the CPU module is the time which is obtained by adjusting the time information (UTC) acquired from the SNTP server (time information server) based on the time zone set in "Operation Related Setting" under "CPU Parameters" of the CPU parameters.

■Communication timeout

If a response is not received from the SNTP server (time information sever) 20 seconds after the time setting is executed, the communication times out. An error does not occur when the communication times out. Instead, the timeout occurrence appears in the event history.

■Delay by communication time

The time set in the CPU module may be delayed by the time required to communicate with the SNTP server's personal computer. To reduce this delay, specify an SNTP server personal computer on the network that is as close to the Ethernet-equipped module as possible.

■When using multi-CPU system configuration

Execute the time setting only for the CPU No.1. Even if the time is set for a CPU module other than the CPU No.1, the clock data for the CPU No.1 is set automatically.

■Setting the execution time

The execution time can be set in the range of 1980 to 2079.

1.10 Security Function

Security suitable for the network environment can be structured by restricting access by each communication path that accesses the CPU module.

The security function has the following access restriction methods.

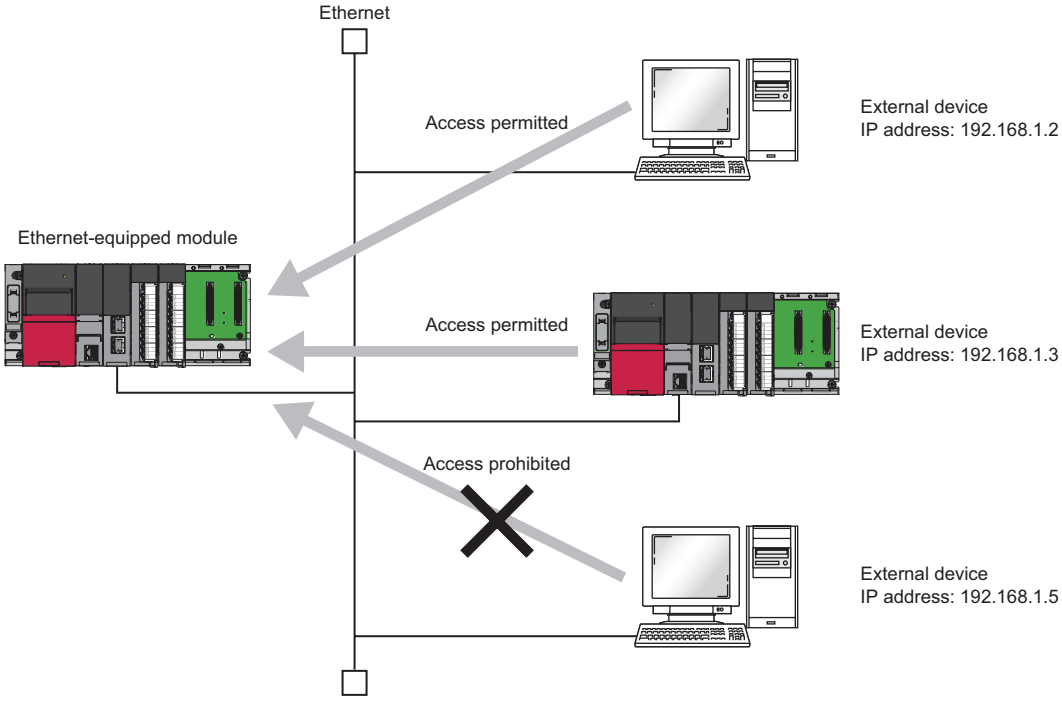
Function	Description
IP filter function	Identifies the IP address of the other device side, and prevents access from an illegal IP address. Access is restricted by setting to pass or block access from the IP address (external device) set in the parameters.
Remote password	Prevent illegal access of the programmable controller from an external device. The remote password set with the parameters authorizes (permits) access from an external device, and restricts access from an unauthorized external device.

IP filter function

Identifies the IP address of the access source, and prevents access from an illegal IP address.

The IP address of the external device to be passed or blocked is set in the parameters, and access from external devices is restricted.

Use of this function is recommended when using in an environment connected to a LAN line.



Restriction

This setting is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".

Point

The IP filter function is one method of preventing illegal access (such as program or data destruction) from an external device. It does not completely prevent illegal access. Incorporate measures other than this function if the programmable controller system's safety must be maintained against illegal access from an external device. Mitsubishi shall not be held liable for any system problems that may occur from illegal access.

Examples of measures for illegal access are given below.

- Install a firewall
- Install a personal computer as a relay station, and control the relay of send/receive data with an application program
- Install an external device for which the access rights can be controlled as a relay station (Contact the network provider or equipment dealer for details on the external devices for which access rights can be controlled.)

Setting procedure

1. Set the IP address for the IP address to be passed or blocked in "Security" under "Application Settings". (☞ Page 138 IP Filter Settings)
2. Write the module parameters to the CPU module.
3. The IP filter function is enabled when the CPU module power is turned off and on or reset.

Point

Even if the connection is established as set with the Ethernet-equipped module's "External Device Configuration" or the program, access from the external device is either passed or blocked following the IP filter settings.
Therefore, if the IP address set in the Ethernet-equipped module's "External Device Configuration" is set to be blocked with the "IP Filter Settings", the IP filter setting is valid and communication with the external device is blocked.

Precautions

If there is a proxy server in the LAN line, block the IP address for the proxy server. If passed, it will not be possible to prevent access from personal computers that access the proxy server.

Remote password

Permits or prohibits access from the external device to the CPU module via the Ethernet-equipped module. This function can prevent illegal access of the CPU module from a remote location.

Point

The remote password is one method of preventing illegal access (such as program or data destruction) from an external device. It does not completely prevent illegal access. Incorporate measures other than this function if the programmable controller system's safety must be maintained against illegal access from an external device. Mitsubishi shall not be held liable for any system problems that may occur from illegal access. Examples of measures for illegal access are given below.

- Install a firewall
- Install a personal computer as a relay station, and control the relay of send/receive data with an application program
- Install an external device for which the access rights can be controlled as a relay station (Contact the network provider or equipment dealer for details on the external devices for which access rights can be controlled.)

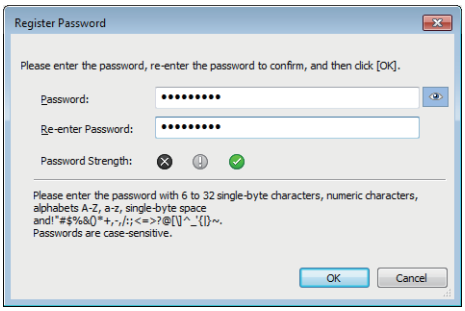
Number of settable modules

A remote password can be set for up to eight modules including the modules other than the Ethernet-equipped module. When using the multi-CPU system configuration, up to eight units can be set for each CPU module.

Setting procedure

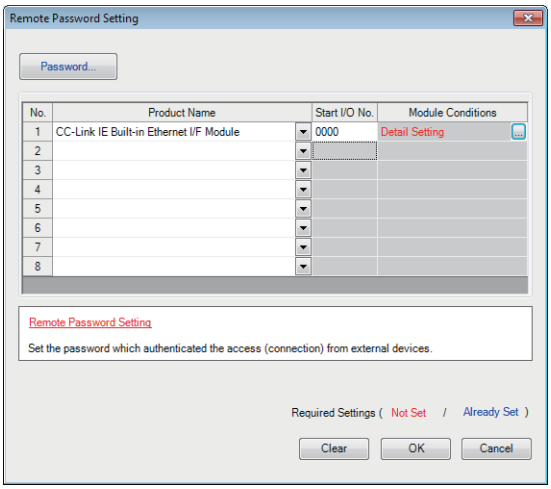
Set on the "Remote Password" window.

Navigation window ⇨ [Parameter] ⇨ [Remote Password]

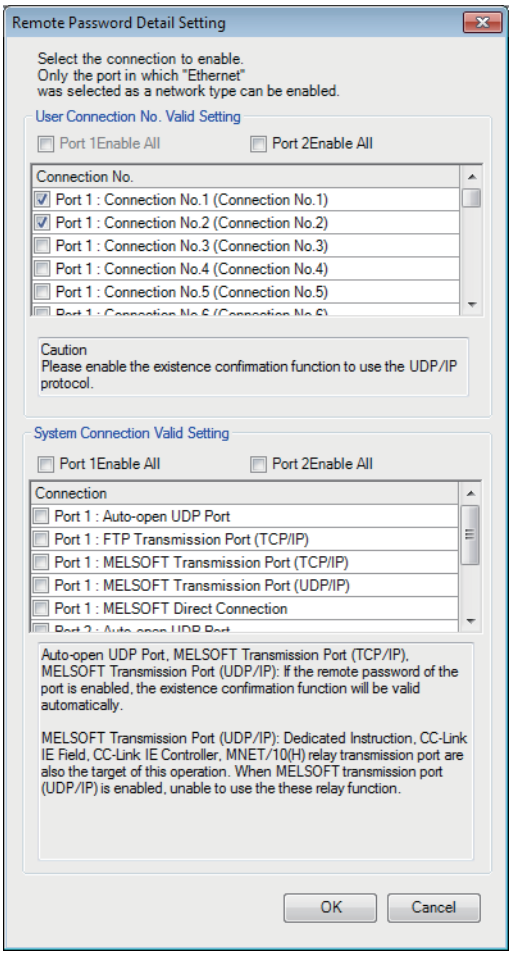

Register Password
Please enter the password, re-enter the password to confirm, and then click [OK].
Password:
Re-enter Password:
Password Strength:
Please enter the password with 6 to 32 single-byte characters, numeric characters, alphabets A-Z, a-z, single-byte space and!"#$%&()*+,-./:;<=>?@[\]^_`{|}~.
Passwords are case-sensitive.
OK
Cancel

1. Register the remote password on the "Register Password" window.

[Password] button



2. Select the module for which the remote password is to be applied, and set the start I/O number.


Remote Password Detail Setting
Select the connection to enable.
Only the port in which "Ethernet" was selected as a network type can be enabled.
User Connection No. Valid Setting
Port 1Enable All
Port 2Enable All
Connection No.
Port 1 : Connection No.1 (Connection No.1)
Port 1 : Connection No.2 (Connection No.2)
Port 1 : Connection No.3 (Connection No.3)
Port 1 : Connection No.4 (Connection No.4)
Port 1 : Connection No.5 (Connection No.5)
Caution
Please enable the existence confirmation function to use the UDP/IP protocol.
System Connection Valid Setting
Port 1Enable All
Port 2Enable All
Connection
Port 1 : Auto-open UDP Port
Port 1 : FTP Transmission Port (TCP/IP)
Port 1 : MELSOFT Transmission Port (TCP/IP)
Port 1 : MELSOFT Transmission Port (UDP/IP)
Port 1 : MELSOFT Direct Connection
Auto-open UDP Port, MELSOFT Transmission Port (TCP/IP), MELSOFT Transmission Port (UDP/IP): If the remote password of the port is enabled, the existence confirmation function will be valid automatically.
MELSOFT Transmission Port (UDP/IP): Dedicated Instruction, CC-Link IE Field, CC-Link IE Controller, MNET/10(H) relay transmission port are also the target of this operation. When MELSOFT transmission port (UDP/IP) is enabled, unable to use the these relay function.
OK
Cancel

3. Set the target connection on the "Remote Password Detail Setting" window.

"Detail Setting" for the target module.

4. Write the remote password to the CPU module.
5. The remote password is enabled when the CPU module is powered off and on or reset.

Access permit/prohibit processing operation

This section describes the processing for permitting or prohibiting access of the CPU module with remote password by the external device.

■Access permit processing (Unlock processing)

The external device trying to communicate unlocks the remote password set for the connected Ethernet-equipped module. If the password is not unlocked, the Ethernet-equipped module to which the external device is connected prohibits access, so an error occurs in the external device.

The unlocking method is shown below.

- SLMP dedicated command (Password Unlock)
- Dedicated command (password-unlock) for file transfer function (FTP server)
- Input password from engineering tool

■Access processing

Access to the specified station is possible when the remote password is correctly unlocked. Execute the arbitrary access.

■Access prohibit processing (Lock processing)

When access to the specified station ends, lock the remote password from the external device to disable subsequent access.

The locking method is shown below.

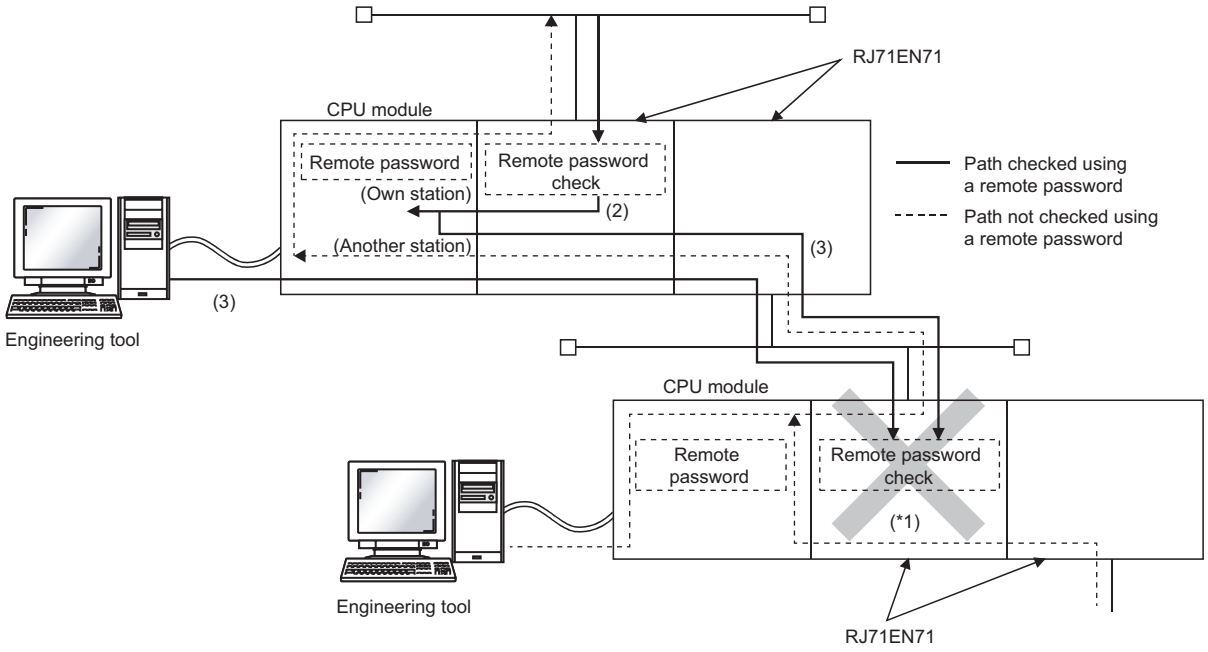
- SLMP dedicated command (Password Lock)
- Dedicated command (password-lock) for file transfer function (FTP server)
- Lock with engineering tool (executed automatically)

Remote password check operation

■Communication that is checked

The Ethernet-equipped module checks the remote password for a communication request made to the own station or other station received from the external device.

When checking a remote password for modules with multiple connections, the connection for which the remote password is set.



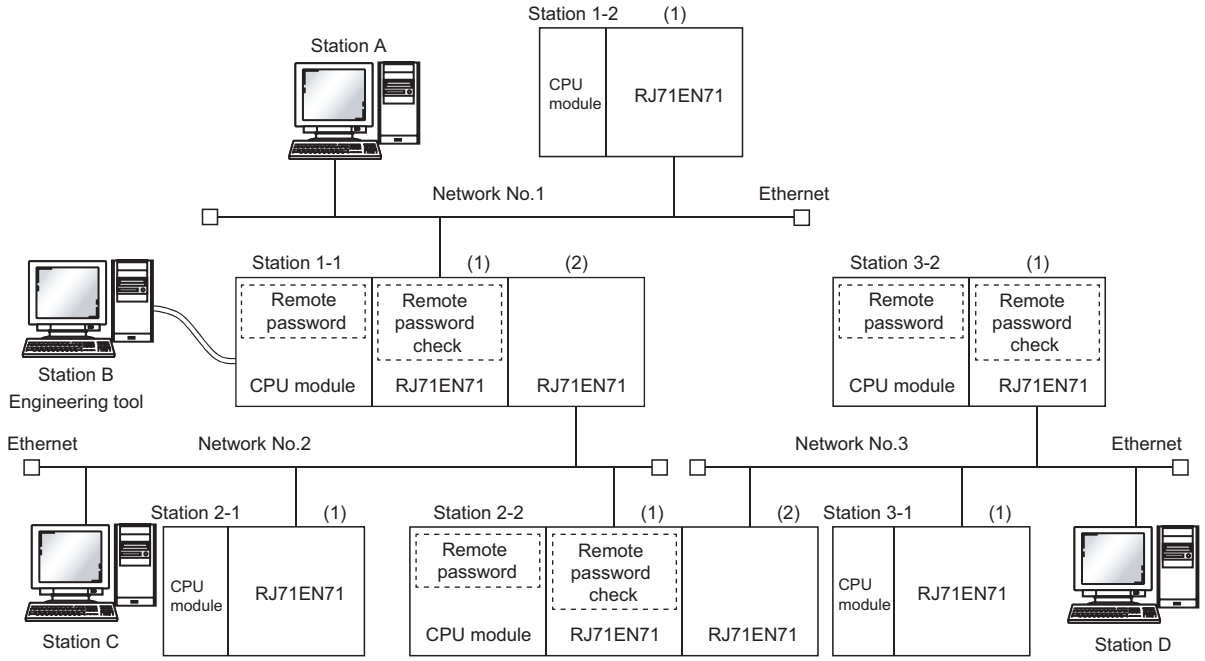
*1 The remote password check is set, so the communication request from the external device is not accepted. If the remote password check is not set, the communication request can be accepted and data can be exchanged from the external device.

■Accessible station

The station accessible from the external device when a remote password is set for the CPU module and the station that can unlock/lock the remote password are limited to those in the same network number

The following figure shows an example of when the remote password is set for multiple stations in the system.

Ex.



*1 The password can be unlocked and locked by the following external devices.
1-1 station (1): A station only
2-2 station (1): C station only
3-2 station (1): D station only

○: Station accessible from external device after remote password is unlocked

△: Station accessible from external device even if remote password is not unlocked

×: Station that cannot be accessed from external device

External device*2 (Request source)	Target programmable controller (request source)					
	1-1 station CPU	1-2 station CPU	2-1 station CPU	2-2 station CPU	3-1 station CPU	3-2 station CPU
A station	○	△	○	×	×	×
B station	△	△	△	×	×	×
C station	△	△	△	○	○	×
D station	△	△	△	△	△	○

*2 The A station can access the ○ station after the remote password for 1-1 station (1) is unlocked. The △ station can be accessed if the communication line is open.
The B station can access the △ station if the communication line is open.
The C station can access the ○ station after the remote password for 2-2 station (1) is unlocked. The △ station can be accessed if the communication line is open.
The D station can access the ○ station after the remote password for 3-2 station (1) is unlocked. The △ station can be accessed if the communication line is open.

Precautions

The following section lists the precautions for using remote password.

■Set connection

Set the remote password for the connection used to exchange data with an external device that can execute the unlock/lock processing.

■When remote password is set for UDP/IP connection

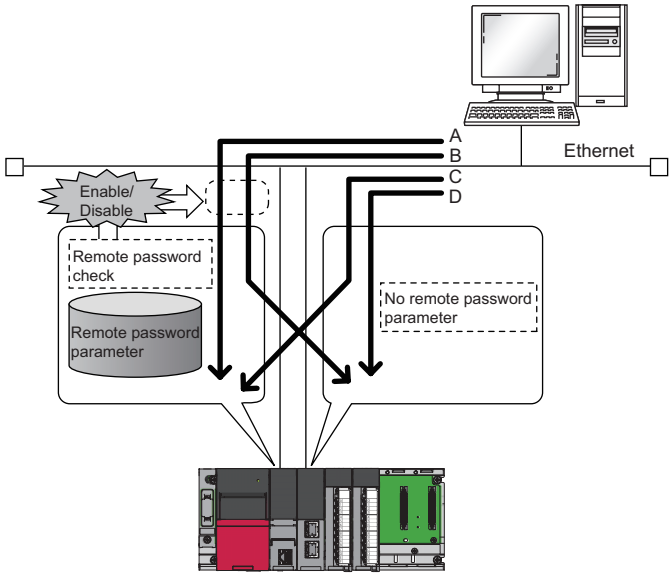
- Determine the external device to communicate with and exchange the data. (With UPD/IP, after the remote password is unlocked data can be exchanged with devices other than the unlocked external device too. Determine the communication device before starting use.)
- Always lock the remote password after data communication is finished. (If the remote password is not locked, the unlocked state is held until timeout occurs.)
- Set "UDP" for "Existence Confirmation" of the target connection in "External Device Configuration" under "Basic Settings". Set as small a value as possible for the "Destination Alive Check Start Interval Timer" and "Destination Alive Check Interval Timer" in "Timer Settings for Data Communication" under "Application Settings".

■TCP/IP close processing

If the TCP/IP is closed before the TCP/IP is locked, the CPU module will automatically start the lock processing.

■Remote password valid range

The remote password is valid only for access from the Ethernet-equipped module for which the parameters are set. When using multiple CPU modules in a multi-CPU system, set a remote password for each CPU module for requiring a remote password.



The remote password is checked when accessing with path A or B.
The remote password is not checked when accessing with path C or D.

■Connection for nonprocedural fixed buffer communication

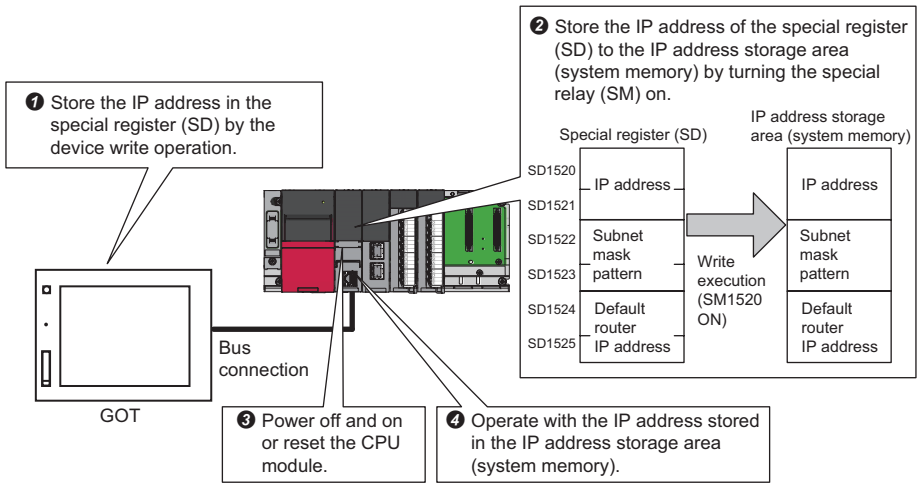
The remote password is not checked during communication for nonprocedural fixed buffer communication, so do not set the remote password check.

■Accessing another station's programmable controller

When the external device is accessing another station's programmable controller via the Ethernet-equipped module, it may not be possible to access the programmable controller if a remote password is set for the CPU module at the relay station or access station.

1.11 IP Address Change Function

This function can store the special relay and special register values to change the CPU module IP address without changing the parameter settings.


❷ Store the IP address of the special register (SD) to the IP address storage area (system memory) by turning the special relay (SM) on.
❶ Store the IP address in the special register (SD) by the device write operation.
Special register (SD)
IP address storage area (system memory)
SD1520
SD1521
SD1522
SD1523
SD1524
SD1525
IP address
Subnet mask pattern
Default router IP address
Write execution (SM1520 ON)
Bus connection
GOT
❸ Power off and on or reset the CPU module.
❹ Operate with the IP address stored in the IP address storage area (system memory).

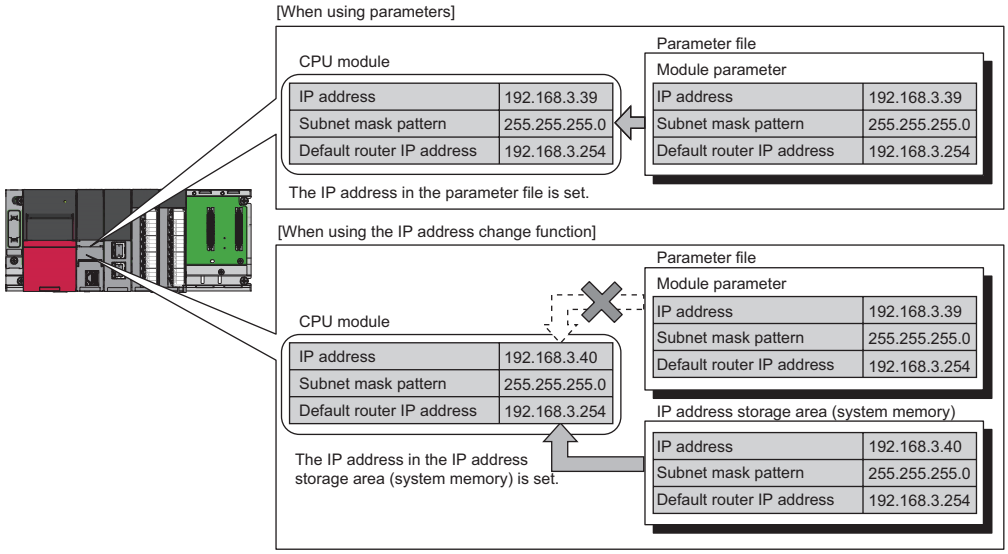
Point

This function can be used by manipulating the special relay and special register values from the GOT. Refer to the list of special relays and special registers in the following manual for details on the special relays and special registers used with this function.

MELSEC iQ-R CPU Module User's Manual (Application)

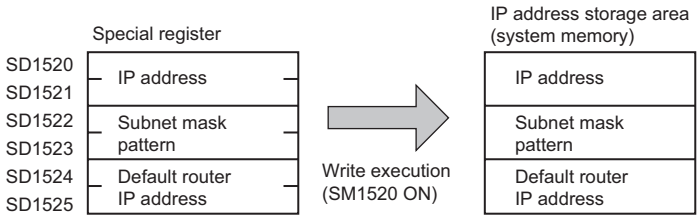
CPU module IP address

The value set with the module parameters during initial processing is set as the CPU module IP address. When this function is used, the IP address set when the CPU module is initialized is the value stored in the IP address storage area (system memory) instead of the value set in the parameters.


[When using parameters]
CPU module
IP address 192.168.3.39
Subnet mask pattern 255.255.255.0
Default router IP address 192.168.3.254
Parameter file
Module parameter
IP address 192.168.3.39
Subnet mask pattern 255.255.255.0
Default router IP address 192.168.3.254
The IP address in the parameter file is set.
[When using the IP address change function]
Parameter file
Module parameter
IP address 192.168.3.39
Subnet mask pattern 255.255.255.0
Default router IP address 192.168.3.254
CPU module
IP address 192.168.3.40
Subnet mask pattern 255.255.255.0
Default router IP address 192.168.3.254
IP address storage area (system memory)
IP address 192.168.3.40
Subnet mask pattern 255.255.255.0
Default router IP address 192.168.3.254
The IP address in the IP address storage area (system memory) is set.

Writing and clearing the IP address

The IP address value is written into the IP address storage area (system memory). The write and clear operations are performed with the special relay and special register.



Usage methods

Write operation

Execute writing by storing the IP address to be changed in SD1520 to SD1525 (IP address setting) and turning off and on SM1520 (IP address storage area write request).

■Operations

1. Store the value to be changed in SD1520 to SD1525 (IP address setting).
2. Turn off and on SM1520 (IP address storage area write request).
3. Check the write results with the following special relays and special registers.

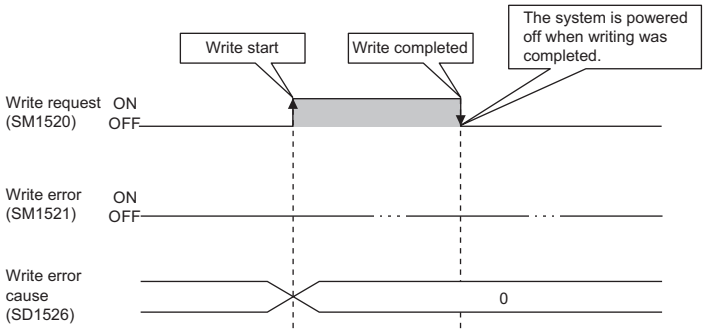
Device	At normal completion	At abnormal completion
SM1520 (IP address storage area write request)	Off	Off
SM1521 (IP address storage area write error)	Off	On
SD1526 (IP address storage area writing error cause)	—	Stores the cause of the error

4. Power off and on or set the CPU module.
5. If the IP address stored in the IP address storage area (system memory) is a valid value, the stored IP address is set as the CPU module's IP address. (If the value is invalid or not set, the value set in the module parameters is set as the CPU module's IP address.)
6. Check the IP address with the buffer memory. (☞ Page 197 CPU module)

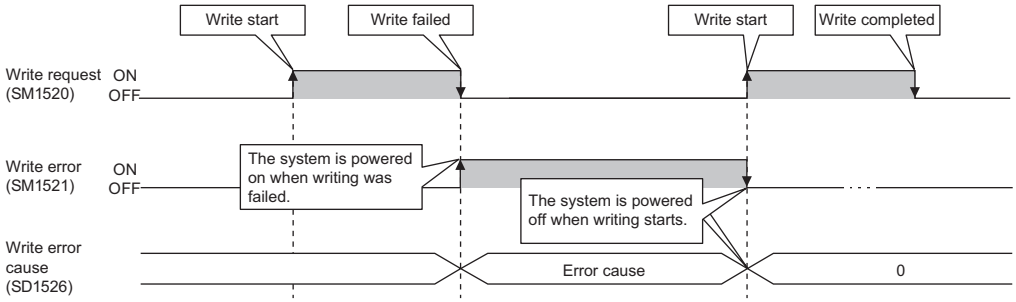
■Operation of special relays and special registers

The following sections shows the operation of the special relays and special registers when writing to the IP address storage area (system memory).

• Operation at normal completion



• Operation at abnormal completion



■Cause of error at abnormal completion

If the data is not written correctly into the IP address storage area (system memory), the cause of the error is stored in SD1526 (IP address storage area writing error cause).

SD1526 value	Cause of error
100H	The SD1520 to SD1525 (IP address setting) value exceeds the setting range.
200H	An error occurred during write.
400H	Writing was started during the clear processing.

Clearing operation

Execute clearing by turning off and on SM1522 (IP address storage area clear request).

■Operations

1. Turn on SM1522 (IP address storage area clear request).

2. Check the write results with the following special relays and special registers.

Device	At normal completion	At abnormal completion
SM1522 (IP address storage area clear request)	Off	Off
SM1523 (IP address storage area clear error)	Off	On
SD1527 (IP address storage area clear error cause)	—	Stores the cause of the error

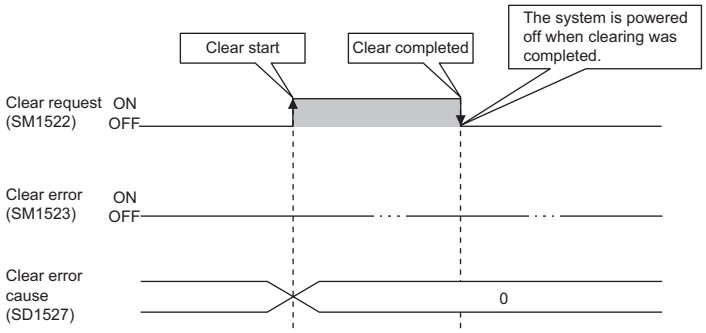
3. Power off and on or set the CPU module.

4. Check the IP address with the buffer memory. (☞ Page 197 CPU module)

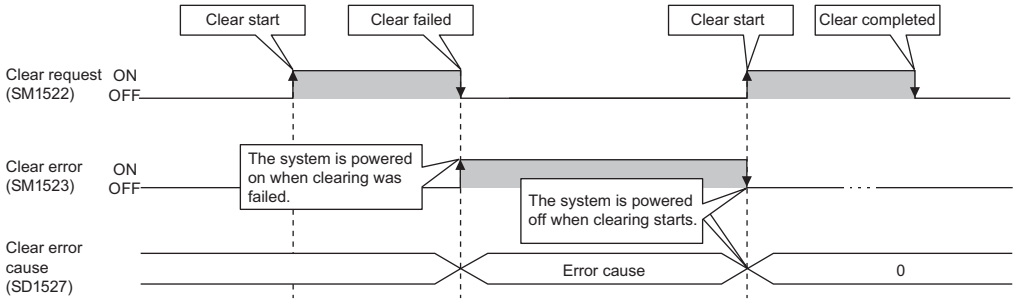
■Operation of special relays and special registers

The following figure shows the operation of the special relays and special registers when clearing the IP address storage area (system memory).

• Operation at normal completion



• Operation at abnormal completion



■Cause of error at abnormal completion

If the IP address storage area (system memory) is not cleared correctly, the error cause is stored in SD1527 (IP address storage area clear error cause).

SD1527 value	Cause of error
200H	Error occurred during clearing.
400H	Clearing was started during the write processing.

Checking the IP address

The CPU module IP address can be checked with the buffer memory.

- Own node IP address (Un\G50 to Un\G51)
- Subnet mask (Un\G60 to Un\G61)
- Default gateway IP address (Un\G64 to Un\G65)

Precautions

The following section lists the precautions for using the IP address.

Power off and reset operation

Do not turn the CPU module power off or execute reset when writing to or clearing the IP address storage area (system memory). The values may not be applied onto the IP address storage area (system memory). Power off or reset the CPU module after checking the falling edge of SM1520 (IP address storage area write request) or SM1522 (IP address storage area clear request).

Parameter IP address

For the CPU module IP address, the value in the IP address storage area (system memory) has precedence over the parameter value. When using the IP address specified with the parameters, clear the IP address storage area (system memory).

Write processing and clear processing execution timing

- It may not be possible to execute the write or clear processing to the IP address storage area (system memory) if an operation that turns off and on, or on and off SM1520 (IP address storage area write request) or SM1522 (IP address storage area clear request) in a short time is executed.
- If SM1520 (IP address storage area write request) is turned off and on again while writing to the IP address storage area (system memory), the write processing that was executed first will complete normally, and the following write operation will be ignored. (This also applies to the clear operation.)
- If SM1522 (IP address storage area clear request) is turned off and on again while writing to the IP address storage area (system memory), the clear operation will not be completed. (This also applies if writing is executed during the clear processing.)
- If both SM1520 (IP address storage area write request) and SM1522 (IP address storage area clear request) are turned off and on, the write operation will be executed as a priority, and the clear operation will not be completed.

2 PARAMETER SETTINGS

This chapter describes the parameter settings required for communications between the Ethernet-equipped module and external devices.

2.1 Setting Parameters

1. Add the RJ71EN71 in the engineering tool. *1

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]

2. The basic setting and application setting are included in the parameter settings. Select one of the settings from the tree on the window shown below.

Navigation window ⇨ [Parameter] ⇨ Target module ⇨ [Module Parameter]

3. After setting parameters, click the [Apply] button.

4. Write the settings to the CPU module using the engineering tool.

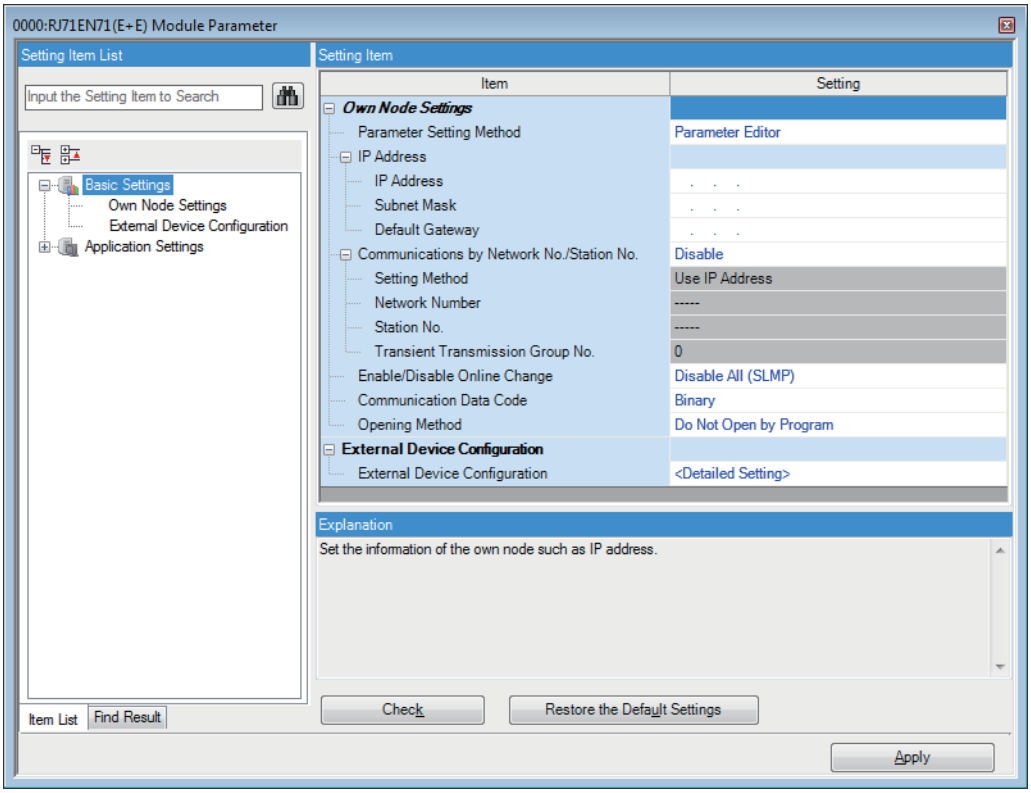
[Online] ⇨ [Write to PLC]

5. The settings are reflected by resetting the CPU module or powering off and on the system.

*1 Addition of the module is not required when using the Ethernet function of the CPU module.

2.2 Basic Settings

Set the own node settings and external device configuration of the Ethernet-equipped module.



Setting items	Description	Reference
Own Node Settings	Set the IP address and communication data code of the Ethernet-equipped module.	Page 125 Own Node Settings
External Device Configuration	Set the method and protocol used for communicating with external devices.	Page 127 External Device Configuration

Own Node Settings

Set the IP address and communication data code of the Ethernet-equipped module.

Item		Description	Setting range
Parameter Setting Method		Set the own station settings by parameters.	Parameter Editor (fixed)
IP Address	IP Address	Set the IP address of the own station. Ensure that the Ethernet-equipped module on the own station and the external device to be communicated with have the same class and subnet address. Consult with the network manager for the IP address setting. ☞ Page 126 IP Address	• Blank • 0.0.0.1 to 223.255.255.254 (Default: Blank)
	Subnet Mask	Set the subnet mask pattern of the default gateway when setting the IP address of the default gateway and communicating with an external device on another network via a router. All the devices on a subnetwork must have the same subnet mask. This setting is not required when communicating in single network.	• Blank • 0.0.0.1 to 255.255.255.255 (Default: Blank)
	Default Gateway	Set the IP address of the default gateway (the device which the own node passes through to access a device of another network). Set the value that satisfies the following conditions. • The IP address class is any of A, B, and C. • The subnet address of the default gateway is the same as that of the Ethernet-equipped module on the own station. • The host address bits are not all "0" or all "1".	• Blank • 0.0.0.1 to 223.255.255.254 (Default: Blank)
Communications by Network No./Station No.*1	—	Select "Enable" to set the network number, station number, and transient transmission group number. This setting is not required when the following functions are not used. • Connection with the MELSOFT products and the GOT (when connecting by specifying the network number and station number) • Communications using SLMP (when specifying the target station with its network number and station number) • Communications using the link dedicated instruction • Communications with different networks	• Disable • Enable (Default: Disable)
	Setting Method	Select the method for setting the network number and station number. (☞ Page 126 Setting Method)	• Use IP Address • Not Use IP Address (Default: Use IP Address)
	Network Number	Enter the network number of the own station when selecting "Not Use IP Address" in "Setting Method".	1 to 239 (Default: 1)
	Station No.	Enter the station number of the own station when selecting "Not Use IP Address" in "Setting Method".	1 to 120 (Default: 1)
	Transient Transmission Group No.	Set the transient transmission group number of the own station.	0 to 32 (Default: 0)
Enable/Disable Online Change		Select whether to enable external devices to write data in SLMP communications while the CPU module is in RUN state. (☞ Page 126 Enable/Disable Online Change)	• Disable All (SLMP) • Enable All (SLMP) (Default: Disable All (SLMP))
Communication Data Code		Select the communication data code used for communications.	• Binary • ASCII (Default: Binary)
Opening Method		Select how to open a connection when using UDP/IP communications or Passive open of TCP/IP communications. • When "Do Not Open by Program" is selected, a connection is open when the system received the Active request. Program for open/close processing is not required. • When "Open by Program" is selected, the open/close processing are performed by a program. The module cannot communicate when the CPU module is in STOP state.	• Do Not Open by Program • Open by Program (Default: Do Not Open by Program)

*1 This setting is not available for the CPU module.

IP Address

■IP Address

When the parameters are written without setting the IP address, the following address is set.

Module		IP address
RJ71EN71	P1 connector	192.168.3.40
	P2 connector	192.168.4.40
CPU module		192.168.3.39

Communications by Network No./Station No.

■Setting Method

When "Use IP Address" is selected, network number and station number will be set from the third and fourth octet of the IP address.

For example, when IP address is set to 192.168.1.10, the network number is set to "1" and the station number is set to "10".

When the IP address is used, the value out of the range of the network number and station number cannot be set in the third octet and fourth octet

When "Not Use IP Address" is selected, set the network number and station number.

Point

When "Port 1 Network Type" and "Port 2 Network Type" are set to "Ethernet" for the RJ71EN71 and the same network number is set for both of P1 and P2, P1 is always used for relay to other networks.

Enable/Disable Online Change

Select whether to enable SLMP data write command received by the Ethernet-equipped module received while the CPU module is in RUN state.

This setting is effective for not only the CPU module on the own station but also the ones on the other stations.

When "Disable All (SLMP)" is selected, data writing using SLMP is disabled while the CPU module is in RUN state.

When "Enable All (SLMP)" is selected, data writing using SLMP is enabled even when the CPU module is in RUN state.

To write data to the FTP server when the CPU module is in RUN state, set "Allow Online Change" under "FTP Server Settings" in "Application Settings". (☞ Page 133 FTP Server Settings)

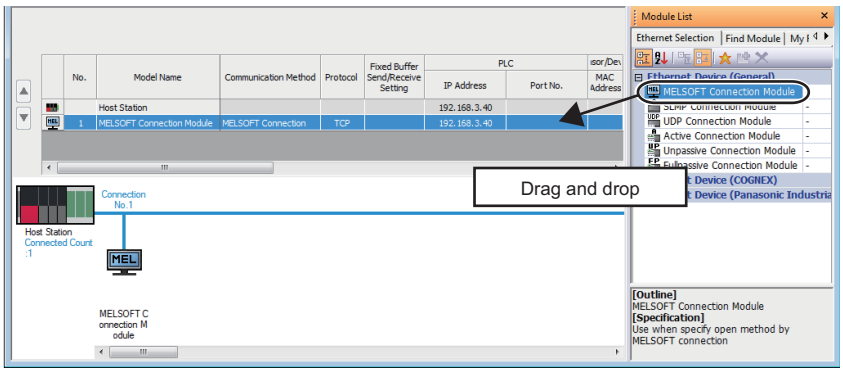
External Device Configuration

Set the method and protocol used for communicating with external devices.

Setting procedure

The procedure for setting the external device to be connected is shown below.

1. Select the external device to be connected in "Module List" and drag it to "List of devices" or "Device map area".



2. Set the required items. The required items vary depending on the selected external device.

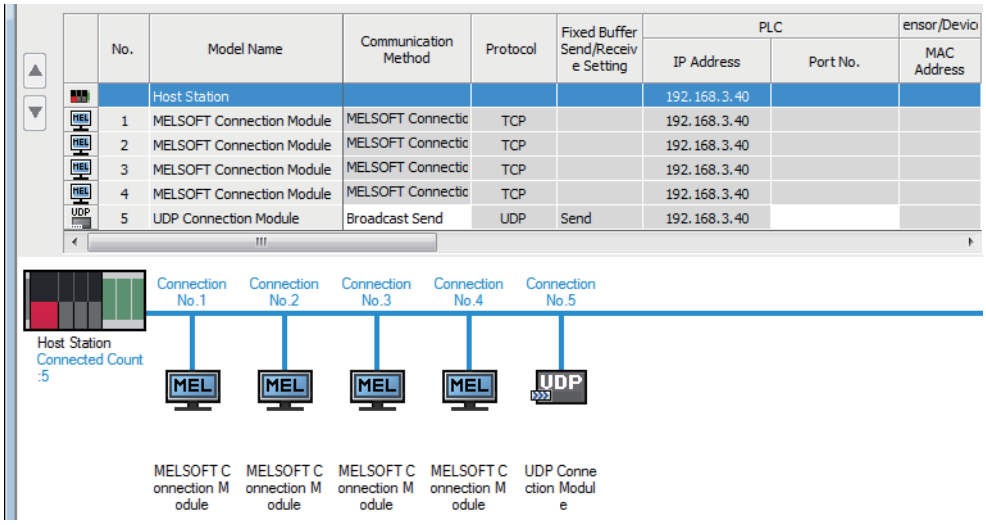
3. Select [Close with Discarding the Setting] and close the "External Device Configuration" window.

Restriction

External devices must be set from the connection No.1

To use specific connection number, set "MELSOFT Connection Module" in the connection number not used.

• When only the connection No.5 is used.



Setting items

Item		Description	Setting range
No.		Connection number for distinguishing settings for each user connection.	The number is set in the following range starting with 1. • RJ71EN71: 1 to 64[*1] • CPU module: 1 to 16
Model Name		The name of the external device is displayed.	—
Communication Measure		Set the method for communication with the external device.	• Broadcast Send • Broadcast Receive • Fixed Buffer (Procedure Exist)[*2] • Fixed Buffer (No Procedure)[*2] • Random Access Buffer[*2] • Predefined Protocol • Socket Communication[*3] • MELSOFT Connection • SLMP
Protocol		Select the communication protocol for the external device.	• TCP • UDP
Fixed Buffer Send/Receive Setting[*2]		For communications using a fixed buffer, select whether to use the buffer for sending or for receiving in a connection to the external device.	• Send • Receive • Pairing (Receive) • Pairing (Send)
PLC	IP Address	The IP address of the own node, which is set in "IP Address", is displayed.	—
	Port No.	Set the port number for each connection of the Ethernet-equipped module.	1 to 4999, 5010 to 65534 (Default: Blank)
Sensor/Device	MAC Address	The setting is not required.	—
	Host Name	The setting is not required.	—
	IP Address	Set the IP address of the external device.	0.0.0.1 to 223.255.255.254 (Default: Blank)
	Port No.	Set the port number of the external device. Set "65535" to set all the port numbers as the target of data receive.	1 to 65534, 65535 (Default: Blank)
	Subnet Mask	The setting is not required.	—
	Default Gateway	The setting is not required.	—
Existence Confirmation		Select the method of alive check which is performed when the Ethernet-equipped module has not communicated with the external device for a certain period of time. When the module cannot communicate with the external device, the connection will be closed. (☞ Page 129 Existence Confirmation)	• KeepAlive • UDP • Do not confirm existence

*1 When "Q Compatible Ethernet" is selected in the network type, the setting range is 1 to 16.
*2 This setting is not available for the CPU module.
*3 This setting is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".

■Existence Confirmation

When the Ethernet-equipped module has not communicated with the external device for a certain period of time while the connection is open, this function checks whether the external device is alive by sending an alive check message to the device and waiting for the response.

The following table lists the details on alive check.

Item	Applicable protocol	Description
KeepAlive	TCP/IP	This method is used for a connection opened using TCP/IP. The Ethernet-equipped module performs an alive check by sending an alive check ACK message to the external device with which communications have not been performed for a certain period of time and waiting to see whether the response is received. The connection will be automatically closed when the open state is not continued.*1
UDP	UDP/IP	This method is used for a connection opened using UDP/IP. The Ethernet-equipped module performs an alive check by sending the PING command (ICMP echo request/response function) to the external device with which communications have not been performed for a certain period of time and waiting to see whether the response is received.*2
Do not confirm existence	TCP/IP, UDP/IP	Alive check is not performed.

*1 The connection may be disconnected if the external device does not support the TCP KeepAlive function (response to a KeepAlive ACK message).

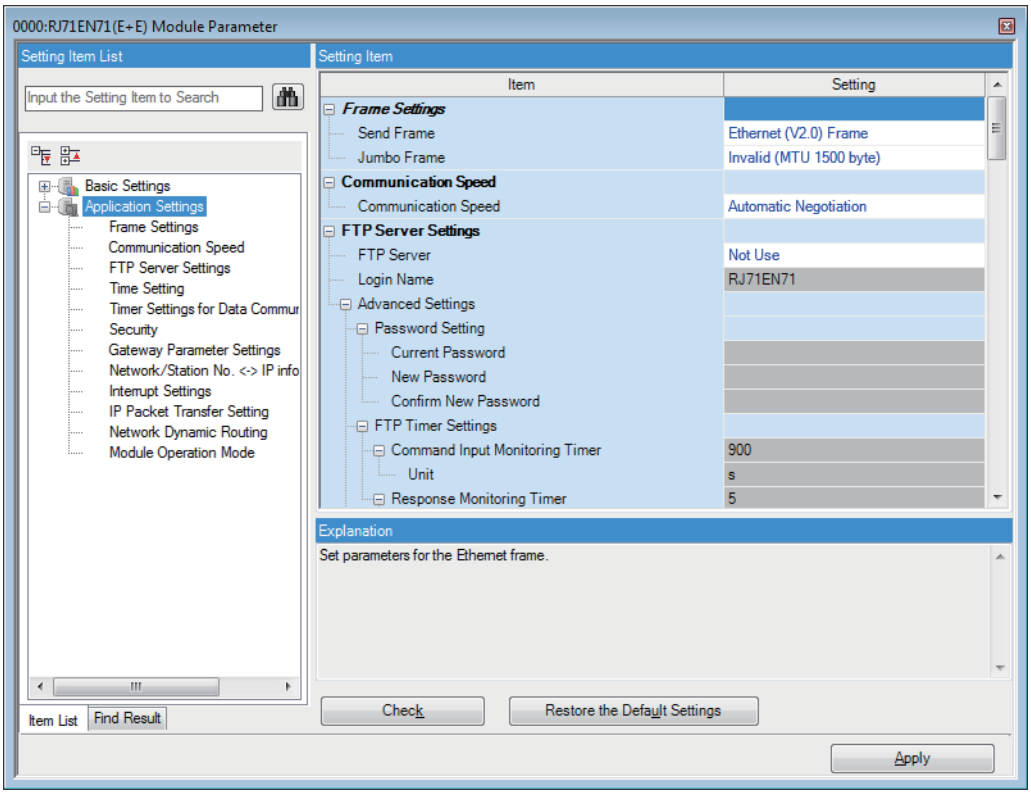
*2 The Ethernet-equipped module automatically sends an echo response packet when it receives a PING echo request command. (It sends a response to the received PING command even if the connection used in the data communications with the external device is closed.)

If a response message cannot be received from the external device (or if an error has been detected) using the alive check function, the following are performed.

- The corresponding connection will be forcibly closed. (The line is disconnected.) Open the connection again using a user program.
- Open completion signal is turned off, and the error code is stored in the buffer memory areas.

2.3 Application Settings

Set frame or communication speed of the Ethernet-equipped module.



Setting items	Description	Reference
Frame Settings*1	Set parameters for the Ethernet frame.	Page 131 Frame Settings
Communication Speed*1	Set the communication speed between the module and the external device.	Page 132 Communication Speed
FTP Server Settings	Set the file transfer function (FTP server).	Page 133 FTP Server Settings
Time Setting*2	Set the time setting function (SNTP client).	Page 134 Time Setting
Timer Settings for Data Communication	Set the timer used for the following communications. • Connection with MELSOFT products and a GOT • Communications using SLMP • Communications using the predefined protocol • Socket communications/Communications using a fixed buffer • Communication using the random access buffer • File transfer function (FTP server)	Page 135 Timer Settings for Data Communication
Security*2	Set the security measures for access to the Ethernet-equipped module.	Page 138 Security
Gateway Parameter Settings	Set to communicate with an external device on Ethernet via a router and gateway.	Page 138 Gateway Parameter Settings
Network/Station No. <-> IP information setting*1	Set to communicate with another network module by network number and station number.	Page 141 Network/Station No. <-> IP information setting
Interrupt Settings*1	Set to start up an interrupt program.	Page 147 Interrupt Settings
IP Packet Transfer Setting*2	Set the IP packet transfer function. For details on the IP packet transfer function, refer to the following. • MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application) • MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)	Page 147 IP Packet Transfer Setting
Network Dynamic Routing*1*2	Set the dynamic routing.	Page 148 Network Dynamic Routing
Module Operation Mode*1	Set the module operation mode.	Page 148 Module Operation Mode

*1 This setting is not available for the CPU module.
*2 This setting is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".

Frame Settings

Set parameters for the Ethernet frame.

Item	Description	Setting range
Send Frame	Set the frame of the Ethernet header for the data link layer to be sent by the RJ71EN71 to the Ethernet (V2.0) frame.	Ethernet (V2.0) Frame (fixed)
Jumbo Frame*1	Set the frame size of the data to be sent over Ethernet. Set when the data transmission speed is 1Gbps and communication is not efficient because the frame size is too small.	• Disable (MTU 1500 byte) • 2KB (MTU 2034 byte) • 3KB (MTU 3058 byte) • 4KB (MTU 4082 byte) • 5KB (MTU 5106 byte) • 6KB (MTU 6130 byte) • 7KB (MTU 7154 byte) • 8KB (MTU 8178 byte) • 9KB (MTU 9004 byte) (Default: Disable (MTU 1500 byte))

*1 This setting is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".

Jumbo Frame

The following describes the precautions for using jumbo frames.

- In TCP/IP communications, the setting is enabled when the external device supports jumbo frames. If the external device does not support jumbo frames, the Ethernet-equipped module sends data in normal frame size even though the "Jumbo Frame" is enabled.
- In TCP/IP communications, data sending from the external device may fail when jumbo frame setting of the Ethernet-equipped module is set to "Disable (MTU 1500 byte)" and that of the external device is enabled. When communicating in jumbo frames, enable the jumbo frame setting for both of the Ethernet-equipped module and external device.
- In UDP/IP communications, the Ethernet-equipped module sends data in jumbo frames according to the "Jumbo Frame" even though the external device does not support jumbo frames.
- When the hub on the communication path does not support jumbo frames, the Ethernet-equipped module cannot communicate with the external device because the hub discards the packets even if the module sends data in jumbo frame.
- Data can be sent in jumbo frames only when the transmission speed is 1Gbps. When "Automatic Negotiation" in "Communication Speed" is set to "Jumbo Frame" and the Ethernet-equipped module communicates at a speed less than 1Gbps, the module sends data in the standard frame size.
- When the item other than "Automatic Negotiation" or "1Gbps/Full-Duplex" is set in "Communication Speed" of "Application Settings", "Jumbo Frame" cannot be set to other than "Disable (MTU 1500 byte)".

Communication Speed

Select the communication speed and communication mode from the following. (Default: Automatic Negotiation)
When "Automatic Negotiation" is selected, communication speed will be automatically set to be the same as that of another device connected to the network.

- Automatic Negotiation
- 1Gbps/Full-Duplex*1
- 100Mbps/Half-Duplex
- 100Mbps/Full-Duplex
- 10Mbps/Half-Duplex
- 10Mbps/Full-Duplex

*1 This setting is not available when the RJ71EN71 network type is set to "Q Compatible Ethernet".
Select "Automatic Negotiation" to use 1Gbps/full-duplex.

Point

- When the auto-negotiation function is used, there is a time lag before starting communication because it requires the time to determine the communication speed and communication mode by FLP burst.
- It is recommended to set the auto-negotiation also in the communication partner when using the auto-negotiation function. If auto-negotiation is not set in ether of the Ethernet-equipped module or partner external device, communication mode cannot be identified and it is automatically set to half-duplex mode, resulting in unstable communication.
- Set the lower communication speed when communication fails due to noise or other causes.

FTP Server Settings

Set the file transfer function (FTP server).

Item		Description	Setting range
FTP Server		Select whether to use the file transfer function (FTP server) of the Ethernet-equipped module.	• Not Use • Use (Default: Not Use)
Login Name		Set the login name to be used for file transfer request (login) from the external device.	12 characters maximum (one-byte alphanumeric character) (Default: RJ71EN71: RJ71EN71, CPU module: RCPU)
Detail Setting	Password Setting	Set the password to be used for file transfer request (login) from the external device. (☞ Page 133 Password Setting)	—
	FTP Timer Settings	Set the following timers used for the file transfer function (FTP server). (☞ Page 133 FTP Timer Settings) • Command Input Monitoring Timer • Response Monitoring Timer	—
	Allow Online Change	Select whether to enable data writing from the external device using the file transfer function (FTP server) while the CPU module is in RUN state.	• Disable • Enable (Default: Disable)

Password Setting

■Current Password

Enter the current password for login to the Ethernet-equipped module.

Default password (initial setting) is the following.

Module	Password
RJ71EN71	RJ71EN71
CPU module	RCPU

Although the default password can be used, it is recommended to change it to another password to prevent unauthorized access.

■New Password, Confirm New Password

Enter the new password in "New Password" and "Confirm New Password" when changing the password.

Set a password within 0 to 32 one-byte characters. Number, alphabet, special character (?,!&\%#*) can be used.

FTP Timer Settings

■Command Input Monitoring Timer

Set the monitoring time for the Ethernet-equipped module to monitor the command input time from the FTP client

It is recommended to use the default value (900s) for this timer value as much as possible.

When changing the setting value, determine the command input monitoring timer value upon consulting with the administrator of the external device or system.

Set a value within the following range.

Unit	Setting range
s	1 to 16383
ms*1	100 to 16383000

*1 Set in increments of 100ms.

The FTP connection is disconnected if there is no command input from the FTP client side within the time of the command input monitoring timer value after the FTP client login.

When restarting the file transfer, start over from the login operation again.

■Response Monitoring Timer

Set the monitoring time for a response from the CPU module after the Ethernet-equipped module receives the request data from the external device and requests the CPU module for read/write.

It is recommended to use the default value (5s) for this timer value as much as possible.

When changing the setting value, determine the response monitoring timer value upon consulting with the system administrator.

Set a value within the following range.

Unit	Setting range
s	1 to 16383
ms*1	100 to 16383000

*1 Set in increments of 100ms.

Time Setting

Set the time setting function (SNTP client).

Item		Description	Setting range
Time Setting (SNTP Client)		Select whether to use the time setting function (SNTP client).	• Not Use • Use (Default: Not Use)
SNTP Server IP Address		Set the IP address of the SNTP server.	0.0.0.1 to 223.255.255.254 (Default: 0.0.0.1)
Timer Setting After Power-on and Reset		Select whether to execute the time setting function upon power-on or reset.	• Disable • Enable (Default: Disable)
Execution Timing	—	Select the execution timing of the time setting.	• Fixed Time • Specified Time Intervals (Default: Fixed Time)
	Specified Time Intervals	When "Specified Time Intervals" is selected, set the time interval (minute) of time setting executions.	1 to 1440 (Default: 1 Minute)
	Specified Time (Hour, Minute, Day of Week)	When "Fixed Time" is selected, set the day of the week and the clock time (hour and minute) when the time setting function is executed. (☞ Page 134 Specified Time (Hour, Minute, Day of Week))	—

Point

The SNTP server must be only one in a network. The time to be output is the same even though multiple modules in the same system obtain time from the same SNTP server.

Execution Timing

■Specified Time (Hour, Minute, Day of Week)

Set an execution time value within the following range in "Clock Time (Hour, Minute)".

Item	Setting range
Hour	0 to 23 (Default: 12)
Minute	0 to 59 (Default: 0)

To specify the day of the week when time setting is executed, set "Not Set" in the day when time setting is not executed under "Day of Week". (Time setting is set to be executed every day (all the days are set to "Set") by default.)

When specifying the day of the week, set at least one day of the week to "Set". An error occurs when all the days are set to "Not Set".

Timer Settings for Data Communication

Set the timer used for the following communications.

- Connection with MELSOFT products and a GOT
- Communications using SLMP
- Communications using the predefined protocol
- Socket communications/Communications using a fixed buffer
- Communication using the random access buffer
- File transfer function (FTP server)

When changing the timer settings for data communication, refer to the precautions before setting. (☞ Page 136 Precautions for settings)

Item		Description	Setting range
Change/Set Timer Values		Select whether to change timer values from the default. The timer operates with its default value when "No" is selected.	• No • Yes (Default: No)
TCP Resend Timer		Set the waiting time to resend ACK if it is not returned when a connection is opened or data is sent in TCP/IP. This timer is also used for Time to Live for the ARP function. (ARP is resent at intervals of 50ms if no response to an ARP request is returned.) This timer is also used as the minimum set time for arrival monitoring time for data link instructions.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 10s)
Destination Alive Check Start Interval Timer		Set the time interval between the reception of the last message from the external device and the start of alive check.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 600s)
Destination Alive Check Interval Timer		Set the time interval for performing alive check again when no response is returned from the external device of alive check target.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 10s)
Destination Alive Check Resend Count		Set the number of times to perform alive check when no response is returned from the external device of alive check target.	1 to 99999 (Default: 3)
Detail Setting	Response Monitoring Timer	Set the following time. • The time to wait for a response after sending command in communications with a fixed buffer (procedure exists) • The time interval between the first message and last message when receiving the divided messages.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 30s)
	TCP ULP Timer	Set the time-to-live of the send packet in TCP/IP communications. For example, when the TCP resend timer value is set to 10 seconds and the TCP ULP timer value is set to 30 seconds, data will be resend every 10 seconds if no response is returned from the external device after data sending, and timeout error occurs if no response is returned within 30 seconds.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 30s)
	TCP End Timer	When closing the TCP/IP connection by the own station, set the monitoring time for waiting for a FIN from the external device after the own station sends a FIN and an ACK is returned from the external device. If a FIN is not received from the external device within the time specified by the TCP end timer value, an RST is sent to the external device and the connection is forcibly closed.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 20s)
	TCP Zero Window Timer	Set the receive buffer value on the receive side. If the receive buffer on the receive side has no free space (window size = 0), data sending is waited until the receive side has free receive buffer space. At this time, the sending side sends packets for checking the send window to the receive side according to the TCP zero window timer value to check the receiving status.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 10s)
	IP Assembly Timer	The communication data may be divided at the IP level before being sent due to the buffer limitation of the sending station or the receiving station. Set the waiting time for the divided data in such a case.	Unit [s]: 1 to 16383 Unit [ms]: 100 to 16383000*1 (Default: 5s)

*1 Set in increments of 100ms.

Precautions for settings

■Setting value for each timer of the Ethernet-equipped module side.

Set the timer values so that the following formula is met.

(Response monitoring timer value) ≥ (TCP ULP timer value) ≥ (TCP end timer value) ≥ (TCP resend timer value) > (IP assembly timer value)

(TCP resend timer value) = (TCP zero window timer value)

When connecting Mitsubishi products to the line, configure the same settings for both modules.

■Setting value for each timer of the external device side.

Set the timer values so that the following formula is met. The frequency of a communication error, such as a transmission timeout, may be higher if the timer values do not meet the formula.

(TCP ULP timer value on the external device) > (TCP resend timer value on the Ethernet-equipped module)

(Monitoring timer value of the application software on the external device) > {(TCP ULP timer value on the Ethernet-equipped module) × n*1}

*1 "n" is the number of TCP segment transmission and is calculated by the following formula.

$$n = \text{A value that } \left(\frac{\text{Message size sent by the Ethernet-equipped module}}{\text{Maximum Segment size}} \right) \text{ is rounded up to the nearest integer}$$

Ex.

The number of TCP segment transmission when communications are performed on the same line

The Maximum Segment Size is 1460 bytes on the same line (without a router) and the number of TCP segment transmissions is as follows.

- n = 1 when the size of the message sent by the Ethernet-equipped module is 1460 bytes or less
- n = 2 when the size of the message sent by the Ethernet-equipped module is greater than 1460 bytes

Ex.

The number of TCP segment transmission when communications are performed on a different line

The Maximum Segment Size is at least 536 bytes on another line (via a dialup router or other communication device) and the number of TCP segment transmissions is as follows.

- n = 1 when the size of the message sent by the Ethernet-equipped module is 536 bytes or less
- n = 2 when the size of the message sent by the Ethernet-equipped module is greater than 536 bytes and no more than 1072 bytes
- n = 3 when the size of the message sent by the Ethernet-equipped module is greater than 1072 bytes and no more than 1608 bytes

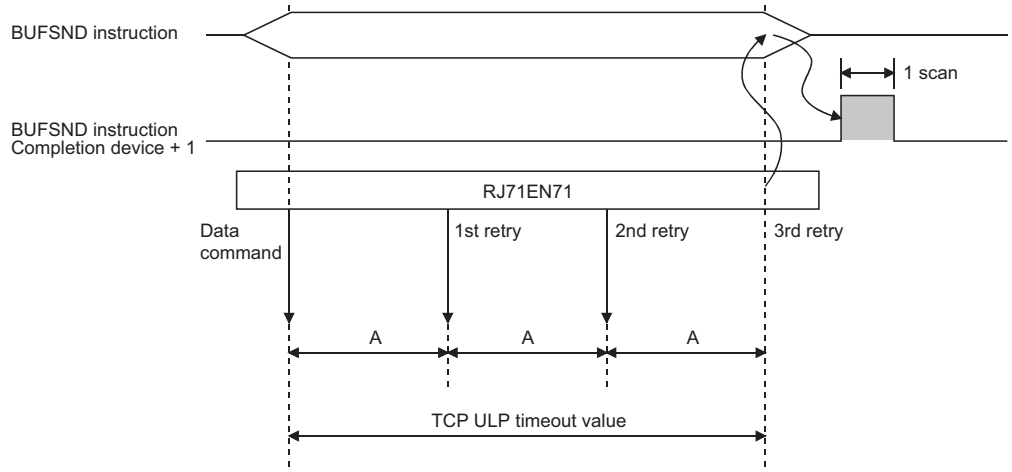
■Number of retries

When a communication failure occurs due to a problem such as noise, change the value so that the number of retries may increase. The number of retries is obtained using the following formula. (When using the default values, 3 = 30 ÷ 10)

Number of retries = TCP ULP timer value ÷ TCP resend timer value

Ex.

When the number of retries is three and data sending fails, a data sending error occurs at the timing shown in the figure below (in communications using the fixed buffer).



A: TCP resend timer value (The time at which data are sent when ACK is not returned after data transmission)

When not performing the above retry process (when setting 0 time), configure the setting so that the following formula is met.

TCP ULP timer value = TCP end timer value = TCP resend timer value

(Set the same value for the timer values.)

Security

Set the security measures for access to the Ethernet-equipped module.

Item		Description	Setting range
IP Filter Settings	IP Filter	Set whether to enable the IP filter function.	• Not Use • Use (Default: Not Use)
	IP Filter Settings	Set the IP address to be allowed or denied. (☞ Page 138 IP Filter Settings)	—
Disable Direct Connection with MELSOFT		Set whether enable or disable direct connection to the engineering tool.	• Disable • Enable (Default: Enable)
Do Not Respond to CPU Module Search		Select whether to respond to the CPU module search.	• Do Not Respond • Respond (Default: Respond)

IP Filter Settings

Up to 32 IP addresses can be set as an IP address to be allowed or denied by the IP filter function.

Range specification and specification of the IP addresses to be excluded from the set range are also possible.

Item	Description	Setting range
Access from IP address below	Select whether to allow or deny the access from the specified IP addresses.	• Allow • Deny (Default: Allow)
Range Setting	Select this item when specifying the IP addresses by range.	(Default: Clear)
IP Address	Set the IP address to be allowed or denied. When selecting "Specify Range", enter the start IP address (left field) and end IP address (right field) of the range.	0.0.0.1 to 223.255.255.254 (Default: Blank)
IP Address Excluded from Range	When selecting "Specify Range", set the IP address to be excluded from the set range. Up to 32 IP addresses can be set.	0.0.0.1 to 223.255.255.254 (Default: Blank)

Gateway Parameter Settings

With gateway parameter settings, the Ethernet-equipped module can communicate with external devices on other Ethernet networks via a router and gateway. One default router and up to eight routers can be set.

Item		Description	Setting range
Gateway Other Than Default Gateway		Set to communicate with an external device on the other Ethernet via a router.	• Use • Not Use (Default: Not Use)
Gateway Information	No.1~No.8	Set the information of the gateway other than the default gateway. (☞ Page 139 Gateway Information)	—

Point

Set the default gateway when communicating via the default gateway. (☞ Page 125 Own Node Settings)

Gateway Information

■Gateway IP Address

When communicating with an external device on another Ethernet network through a gateway other than the default gateway, set the IP address of the gateway. (Setting range: 0.0.0.1 to 223.255.255.254)

Set a value that satisfies the following conditions.

- The IP address class is any of A, B, and C.
- The subnet address of the gateway is the same as that of the Ethernet-equipped module on the own station.
- The host address bits are not all "0" or all "1".

Point

- When the Ethernet-equipped module communicates with an external device on another Ethernet network by Passive open, communication is possible without gateway parameter settings.
- In a system where the Proxy router is used, the gateway parameter settings are not required.

■Subnet Address

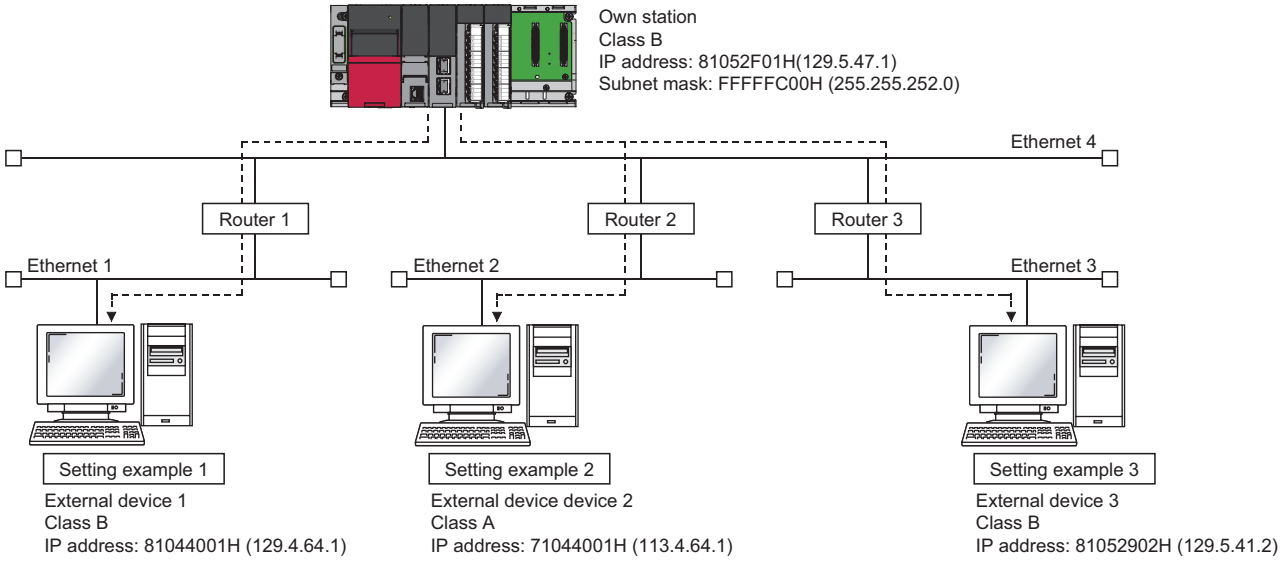
When communicating with an external device on another Ethernet network through a gateway other than the default gateway, set the network address*1 or subnet address*2 of the external device. (Setting range: 0.0.0.1 to 255.255.255.254)

Set a value that satisfies the following conditions.

- The IP address class is any of A, B, and C.
- The host address bits are all "0".

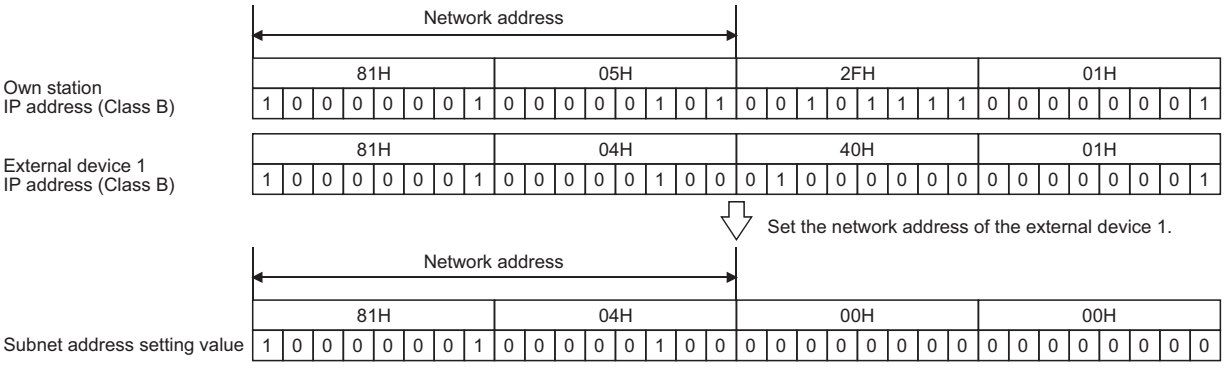
*1 Set the network address of the external device when its class (network address) is different from that of the Ethernet-equipped module on the own station.

*2 Set the network address of the external device when its class (network address) is the same as that of the Ethernet-equipped module on the own station.



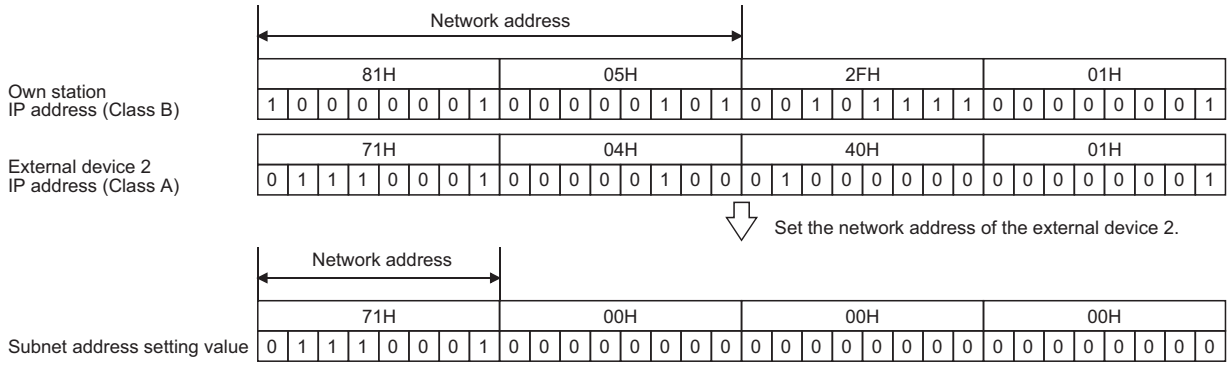
Ex.

When the network addresses differ between the Ethernet-equipped module on the own station and the external device


Network address
Own station
IP address (Class B)
81H 05H 2FH 01H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 0 1 1 1 1 0 0 0 0 0 0 0 1
External device 1
IP address (Class B)
81H 04H 40H 01H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1
Set the network address of the external device 1.
Network address
Subnet address setting value
81H 04H 00H 00H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

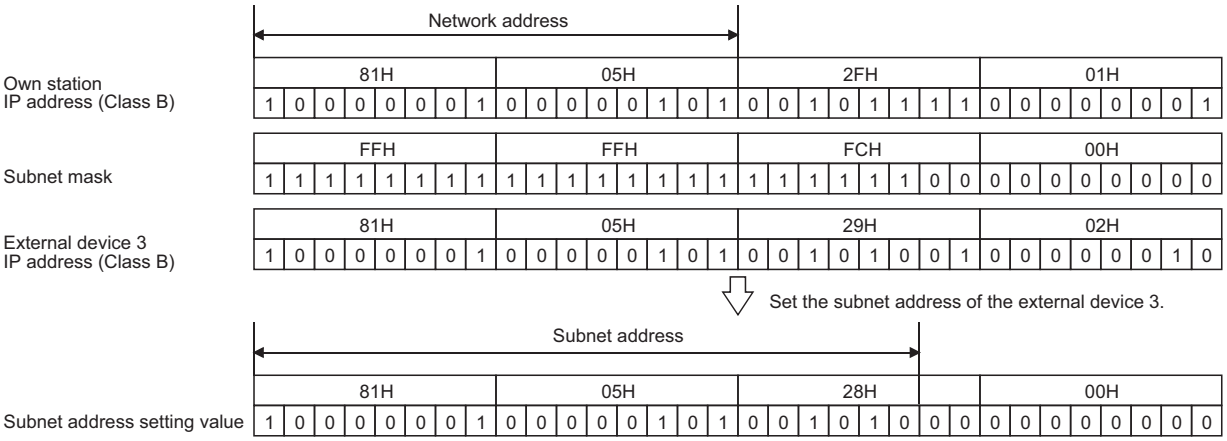
Ex.

When the classes differ between the Ethernet-equipped module on the own station and the external device


Network address
Own station
IP address (Class B)
81H 05H 2FH 01H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 0 1 1 1 1 0 0 0 0 0 0 0 1
External device 2
IP address (Class A)
71H 04H 40H 01H
0 1 1 1 0 0 0 1 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1
Set the network address of the external device 2.
Network address
Subnet address setting value
71H 00H 00H 00H
0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Ex.

When the network address of the Ethernet-equipped module on the own station is the same as that of the external device


Network address
Own station
IP address (Class B)
81H 05H 2FH 01H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 0 1 1 1 1 0 0 0 0 0 0 0 1
Subnet mask
FFH FFH FCH 00H
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0
External device 3
IP address (Class B)
81H 05H 29H 02H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 0 1 0 0 1 0 0 0 0 0 0 1 0
Set the subnet address of the external device 3.
Subnet address
Subnet address setting value
81H 05H 28H 00H
1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0

Network/Station No. <-> IP information setting

Set to communicate with another network module by network number and station number.
Communication in Ethernet is performed according to the IP address and UDP port number, and access to another network is performed according to the network number and station number.
Therefore, when the RJ71EN71 accesses another network, the IP address and UDP port number must be converted into the network number and station number of another network.

Item	Description	Setting range
Setting System	Select the system to obtain the IP address and port number of the external device from its network number and station number. (☞ Page 141 Setting System)	• Automatic Response System • IP Address Calculation System • Table Conversion System • Combination System (Default: Automatic Response System)
Subnet Mask Pattern	Set the subnet mask pattern. (☞ Page 146 Subnet Mask Pattern)	• Blank • 0.0.0.1 to 255.255.255.255 (Default: Blank)
Conversion Settings	Set the information of the external device. (☞ Page 146 Conversion Settings)	—

Point

- When transferring messages which are sent to other stations specifying network number and station number, to another network, the "Gateway Parameter Settings" is required. (☞ Page 138 Gateway Parameter Settings)
- "Network/Station No. <-> IP information setting" is required when other stations are accessed via other Ethernet network systems and must be registered in all the Ethernet-equipped module which has the network number and station number.

Setting System

Select the system to obtain the IP address and port number of the external device from its network number and station number.
There are four methods as shown below. The items required to be set ("Subnet Mask Pattern" and "Conversion Settings") differ depending on the method.
○: Setting is required, ×: Setting is not required

Setting System	Subnet Mask Pattern	Conversion Settings
Automatic Response System	×	×
IP Address Calculation System	○	×
Table Conversion System	×	○
Combination System	○	○

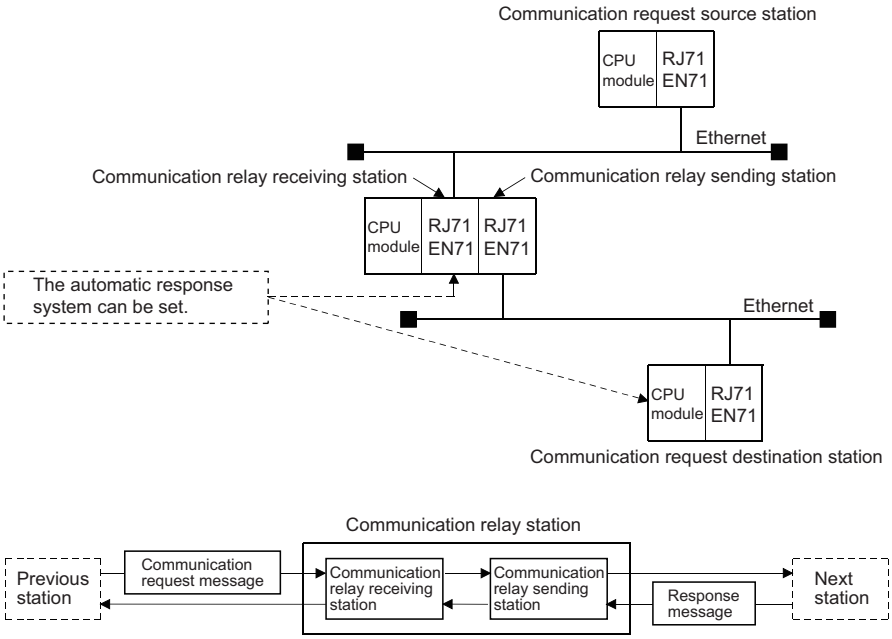
Point

- In MELSOFT connection using UDP/IP, if the external device is not registered in the conversion table of table conversion system, the Ethernet-equipped module communicates with the device using the automatic response system. Therefore, even when both of communications with different networks using the link dedicated instruction and MELSOFT connection are performed simultaneously, the Ethernet-equipped module can communicate with the external device in MELSOFT connection regardless of the registered data in the conversion table.
- If the IP address and port number cannot be obtained when IP address calculation system, table conversion system, or combination system is set, the Ethernet-equipped module will obtain them using the automatic response system and send a response to the external device.

■Automatic Response System

This system differs from the other conversion method in that specification can only be made when the own station is the communication request destination station or communication relay receiving station.

Relay communications via other networks can be performed easily because the IP address and port number of the destination station are not required to be set.



Conversion processing of the automatic response system is as below.

- When receiving the communication request message (command frame), the Ethernet-equipped module internally stores the send source network number, IP address, and UDP port number in the request message, as the station information. The response message (response) for the communication request message is returned to the destination IP address and UDP port number calculated from the stored network number and station number. Therefore, by receiving the other station access communication request message first, the communication destination stations can be maintained.
- The maximum number of station information that can be set is 120. When more than 120 other station access communication request messages are received, the Ethernet-equipped module starts deleting from the oldest data to store the station information in the newly received message communication request message. However, it is ignored if the station information is the same as the station information already stored. (Information from the same station is not stored twice.)

■IP Address Calculation System

This system obtains the IP address of the destination station by calculating the network number and station number with the formula described below. The UDP port number predefined for the Ethernet-equipped module is used as the UDP port number of the destination.

IP address of the partner station = (IP address of the own station) Logical product (Net mask pattern for CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 routing) Logical sum (Network number and station number of the destination)

Conversion processing of the IP address calculation system is as below.

- When a communication request message (command frame) to access other station is received, the IP address is calculated from the network number and station number of the destination in the communication request message, which are stored in the Ethernet-equipped module, and the communication request message is sent to the next station (relay station or destination station).
- The response message (response) for the communication request message is returned based on the return IP address and the stored data above.

Ex.

IP address calculation example

The logical product and logical sum are calculated differently depending on the class of the own station IP address. An IP address is calculated as follows.

(For class A)

- When the own station IP address is 79238102H
- When the net mask pattern for routing other networks is FF000000H
- When the destination network number is 03H, and the station number is 05H

Own station IP Address		7 9 . 2 3 . 8 1 . 0 2
Net Mask Pattern	Logical product	F F . 0 0 . 0 0 . 0 0
Logical product value		7 9 . 0 0 . 0 0 . 0 0
Network No. and station No.	Logical sum	0 3 . 0 5
Partner station IP Address		7 9 . 0 0 . 0 3 . 0 5

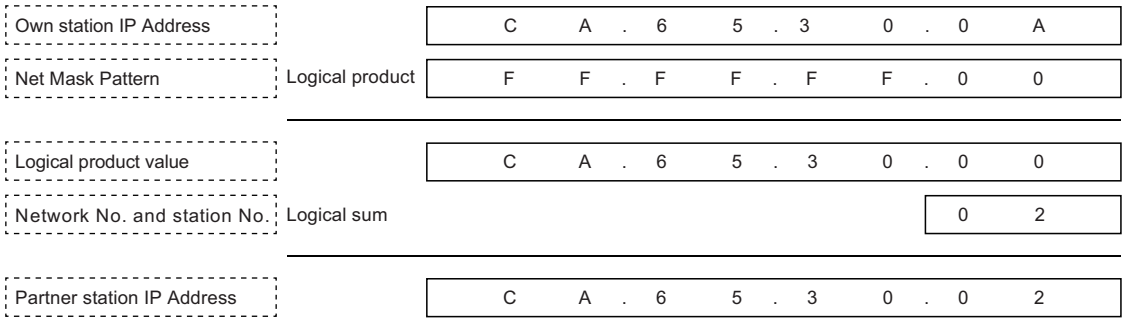
(For class B)

- When the own station IP address is 8438FA0AH
- When the net mask pattern for routing other networks is FFFF0000H
- When the destination network number is 03H, and the station number is 05H

Own station IP Address		8 4 . 3 8 . F A . 0 A
Net Mask Pattern	Logical product	F F . F F . 0 0 . 0 0
Logical product value		8 4 . 3 8 . 0 0 . 0 0
Network No. and station No.	Logical sum	0 3 . 0 5
Partner station IP Address		8 4 . 3 8 . 0 3 . 0 5

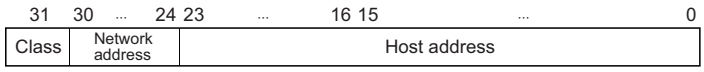
(For class C)

- When the own station IP address is CA65300AH
- When the net mask pattern for routing other networks is FFFFFF00H
- When the destination station number is 02H (The network number is not used.)

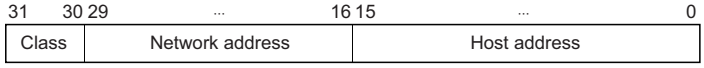

Own station IP Address
C A . 6 5 . 3 0 . 0 A
Net Mask Pattern
Logical product
F F . F F . F F . 0 0
Logical product value
C A . 6 5 . 3 0 . 0 0
Network No. and station No.
Logical sum
0 2
Partner station IP Address
C A . 6 5 . 3 0 . 0 2

Point

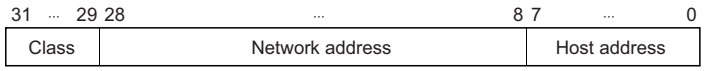
- IP address configuration of class A



- IP address configuration of class B



- IP address configuration of class C



■Table Conversion System

This system uses the network number, station number, IP address set in the conversion table of the Network/Station number <-> IP information. The UDP port number predefined for the Ethernet-equipped module is used as the UDP port number of the destination.

If duplicate network and station numbers are set in the conversion table, the data set with the younger registration number is used.

If no data is registered in the conversion table, communication may not be performed successfully

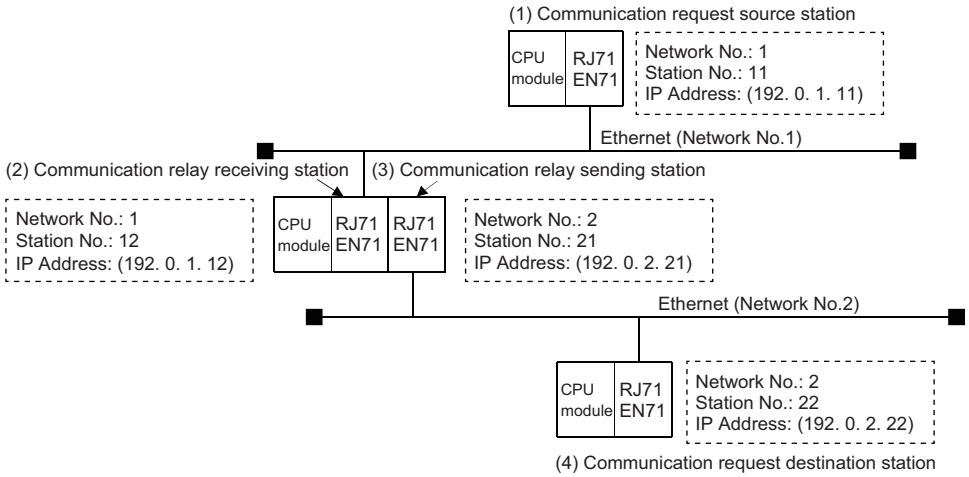
Conversion processing of the table conversion system is as below.

- When a communication request message (command frame) to access other station is received, the same network number and station number are searched in the conversion table of the Network/Station No. <-> IP information, and the communication request message is sent to the destination station with the corresponding IP address.
- The response message (response) for the communication request message is returned based on the return IP address and the data in the conversion table above.

Ex.

Conversion table registration example

The following shows the example of conversion table registration based on the network map.



(a): For communication request message transmission, b): For response message transmission

Item		Setting details of each Ethernet-equipped module when accessing from (1) to (2)			
		(1) Communication request source station (a)	(2)	(3)	(4)
Setting value (decimal)	Network number, station number	1, 12	Setting not required	Setting not required	Setting not required
	IP Address	192.0.1.12			

Item		Setting details of each Ethernet-equipped module when accessing from (1) to (4)			
		(1) Communication request source station (a)	(2) Communication relay receiving station (b)	(3) Communication relay sending station (a)	(4) Communication request destination station (b)
Setting value (decimal)	Network number, station number	1, 12	1, 11	2, 22	2, 21
	IP Address	192.0.1.12	192.0.1.11	192.0.2.22	192.0.2.21

Item		Setting details of each Ethernet-equipped module when accessing from (2) to (1)			
		(1)	(2) Communication request destination station (a)	(3)	(4)
Setting value (decimal)	Network number, station number	Setting not required	1, 11	Setting not required	Setting not required
	IP Address		192.0.1.11		

Item		Setting details of each Ethernet-equipped module when accessing from (3) to (4)			
		(1)	(2)	(3) Communication relay sending station (a)	(4)
Setting value (decimal)	Network number, station number	Setting not required	Setting not required	2, 22	Setting not required
	IP Address			192.0.2.22	

Item		Setting details of each Ethernet-equipped module when accessing from (4) to (1)			
		(1) Communication request source station (b)	(2) Communication relay sending station (a)	(3) Communication relay receiving station (b)	(4) Communication request destination station (a)
Setting value (decimal)	Network number, station number	1, 12	1, 11	2, 22	2, 21
	IP Address	192.0.1.12	192.0.1.11	192.0.2.22	192.0.2.21

Item		Setting details of each Ethernet-equipped module when accessing from (4) to (3)			
		(1)	(2)	(3)	(4) Communication request destination station (a)
Setting value (decimal)	Network number, station number	Setting not required	Setting not required	Setting not required	2, 21
	IP Address				192.0.2.21

■Combination System

This system combines the IP address calculation system and the table conversion system.

Select this system when accessing other stations with the same network number, accessing other stations in other networks or Ethernet with different network number, or relaying from other networks to the Ethernet network system.

The set target Ethernet-equipped module can be installed either at a communication request source station, communication relay station, or communication request destination station.

Conversion processing of the combination system is as below.

- When a communication request message (command frame) to access other station is received, the communication request message is sent to the next station obtained by the table conversion system at first.
- If the IP address of the external device cannot be obtained by the table conversion system, the IP address is obtained by the IP address calculation system to send the communication request message.
- The response message (response) to the communication request message is returned based on the return IP address and data in the conversion table, or the stored data.

The relationship between the conversion method and the definition of the Ethernet-equipped module mounted station is as follows.

○: Can be set, ×: Cannot be set

Conversion method	Ethernet-equipped module mounted station definition			
	Communication request source station	Communication relay station		Communication request destination station
		Relay receiving station	Relay sending station	
Automatic Response System	×*1	○	×*1	○
IP Address Calculation System	○	○	○	○
Table Conversion System	○	○	○	○
Combination System	○	○	○	○

*1 For the external device that completed the communication, the station can be a communication request source station or a relay sending station.

Subnet Mask Pattern

Specify the mask value based on the guidelines given below. This pattern is used in a logical sum with the own station IP address when calculating the IP address of the external device using the IP address calculation system.

When setting the subnet mask, specify the target settings of the IP address class, network address, and subnet address so that all bits are "1" in the mask pattern.

Specify the mask pattern with a decimal/hexadecimal value obtained by dividing the 32-bit mask value into 8-bit segments.

When the subnet mask is not specified, the mask pattern setting is not necessary. The following mask value is used as the mask pattern according to the own station IP Address class.

Class	Mask value used
Class A	FF.00.00.00H
Class B	FF.FF.00.00H
Class C	FF.FF.FF.00H

Conversion Settings

The conversion setting is required to obtain the IP address from the network number and station number using the table conversion system.

If the own station is an Ethernet-equipped module and the next station to which the communication request/response message is passed to access other station is also an Ethernet-equipped module, specify the network number, station number, and IP address of the Ethernet-equipped module of the next station.

Interrupt Settings

Set the parameters required for starting up an interrupt program.

Item	Description	Setting range
Interrupt Occurrence Factor	Set the interrupt cause.*2	• SEND Instruction Data Reception*3 • Reception Connection (Default: Blank)
Channel No./Connection No.	Set the start condition of an interrupt program. When "Interrupt Occurrence Factor" is set to "SEND Instruction Data Reception", set the number of the channel which receives send data. When "Interrupt Occurrence Factor" is set to "Reception Connection", set the number of the connection which receives send data.	• SEND Instruction Data Reception: 1 to 8 • Reception Connection: 1 to 64*1 (Default: Blank)
Detection Method	The detection method for the interrupt condition is displayed when "Interrupt Occurrence Factor" is set.	Edge (Default: Blank)
Interrupt Pointer	Set an interrupt pointer (device (I)) to be used for a program.	Device: I0 to I15, I50 to I1023 (Default: Blank)
Comment	Set a comment for the interrupt pointer used, if required.	256 one-byte characters maximum (Default: Blank)

*1 When "Q Compatible Ethernet" is selected in the network type, the setting range is 1 to 16.
*2 An interrupt program is started when the receive data is stored in the channel or connection specified in "Channel No./Connection No.".
*3 When selecting "SEND Instruction Data Reception", set "Communications by Network No./Station No." under "Own Node Settings" of "Basic Settings" to "Enable", and set the network number and station number.

Point

Maximum number of interrupt settings can be set to one module (sum of the settings for the P1 connector and the P2 connector) is 16.
Setting number of the interrupt settings is shared in P1 connector and P2 connector.
For example, when SI00 is set on the P1 connector side, SI00 on the P2 connector side cannot be set.

IP Packet Transfer Setting

Set when using the IP packet transfer function.
The IP packet transfer function enables the Ethernet device (such as computers) connected to the Ethernet-equipped module to communicate with the device on other networks that has an IP address via CC-Link IE Field Network or CC-Link IE Controller Network.
To use the this function, set "IP Packet Transfer Function" to "Not Use". (Default: Not Use)
For details on the IP packet transfer function, refer to the following.

- 📖 MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)
- 📖 MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

Point

If the application time-out of the request source device occurs due to a heavy communication load on the path that an IP packet takes, measure the response time using the PING command from the request source device and adjust the application timeout time. Data size must be within 1460 bytes when the PING command is used.

Network Dynamic Routing

Set when using the dynamic routing.

Setting "Network Dynamic Routing" is possible only when values are set in "Network Number" and "Station No." under "Own Node Settings" of "Basic Settings". (☞ Page 126 Communications by Network No./Station No.)

For details, refer to the following.

☞ Page 226 Communications with Different Networks

Point

When the communication path is set in "Routing Setting" of the "CPU Parameters", setting of "Routing Setting" has a priority.

Module Operation Mode

Set the module operation mode.

Set the same operation mode for both of the P1 connector and P2 connector.

For details on module communication test mode, refer to the following.

☞ Page 153 Module communication test

Item	Description	Setting range
Module Operation Mode	Online • Normal operation mode Offline • Communication with other stations and dedicated instruction cannot be performed in this mode. Select this mode to debug the program while the network is not yet connected. Module Communication Test • A mode for operating the module communication test. Select this mode to check the operation when the module is in abnormal condition.	• Online • Offline • Module Communication Test (Default: Online)

3 TROUBLESHOOTING

This chapter describes troubleshooting of when the Ethernet function is used.

3.1 Checking with LED

This section describes troubleshooting using LED.

Error status can be determined by status of the RUN LED and the ERR LED.

RUN LED	ERR LED	Error status*1	Description
Off	On, flashing	Major error	An error such as hardware failure or memory failure. The module stops operating.
On	Flashing	Moderate error	An error, such as parameter error, which affect module operation. The module stops operating.
On	On	Minor error	An error such as communication failure. The module continues operating.

*1 When multiple errors occur, the error status is displayed in the order of major, moderate, and minor.

Point

For the RJ71EN71, whether the error occurs in the P1 or P2 can be checked with P ERR LED.

When the RUN LED or READY LED turns off

When the READY LED of the CPU module turns off after power-on, refer to the troubleshooting of the CPU module. (MELSEC iQ-R CPU Module User's Manual (Application))

When the RUN LED of the RJ71EN71 turns off, check the following.

Check item	Action
Is the Ethernet-equipped module mounted correctly?	Securely mount the Ethernet-equipped module on the base unit.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (Page 153 Module communication test)

When the ERROR LED or ERR LED turns on or is flashing

When the ERROR LED of the CPU module turns on or is flashing, perform the module diagnostics of the CPU module.

[Diagnostics] ⇨ [Module Diagnostics (CPU Diagnostics)]

When the ERR LED of the RJ71EN71 turns on or is flashing, identify the error cause using the engineering tool. (Page 151 Checking the Module Status)

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (Page 153 Module communication test)

When the SD/RD LED does not turn on at data sending

When the SD/RD LED does not turn on at data sending, check the following items.

Check item	Action
Is the ERROR LED or ERR LED on or flashing?	Identify the error cause using the engineering tool. (☞ Page 151 Checking the Module Status, Page 154 Checking the Network Status)
Are the cables properly connected?	Correct the cable properly.
	Perform the following tests to check for the status of the cable connection and line. • PING test (☞ Page 158 PING Test) • Communication status test (☞ Page 159 Communication Status Test)
Is the program correct?	Check and correct the send program of the Ethernet-equipped module.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)*1

*1 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

When data cannot be received with the SD/RD LED off

When data cannot be received with the SD/RD LED off, check the following.

Check item	Action
Is the ERROR LED or ERR LED on or flashing?	Identify the error cause using the engineering tool. (☞ Page 151 Checking the Module Status, Page 154 Checking the Network Status)
Are the cables properly connected?	Correct the cable properly.
	Perform the following tests to check for the status of the cable connection and line. • PING test (☞ Page 158 PING Test) • Communication status test (☞ Page 159 Communication Status Test)
Are the parameter settings correct?	Check the module parameters of the Ethernet-equipped module. Correct the value for the following setting if it is wrongly set. • "IP Address" under "Own Node Settings" of "Basic Settings" • "Gateway Parameter Settings" of "Application Settings" ☞ Page 124 PARAMETER SETTINGS
Is the program correct?	Check and correct the send program of the external device.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)*1

*1 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

When the L ER LED turns on

When the L ER LED turns on, check the following.

Check item	Action
Are the Ethernet cables used normally?	• Check if the Ethernet cable which conforms the standard is used. (📖 MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)) • Check if the station-to-station distance is set within range. (📖 MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)) • Check if the Ethernet cables are not disconnected.
Does the cabling condition (bending radius) meet the specifications?	Refer to the manual for the Ethernet cable, and correct the bending radius.
Is the hub used operating normally?	• Check if the hub which conforms the standard is used. (📖 MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)) • Power off and on the hub.
Is there any source of noise near the module or cables?	Change the location of the module or cables.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)

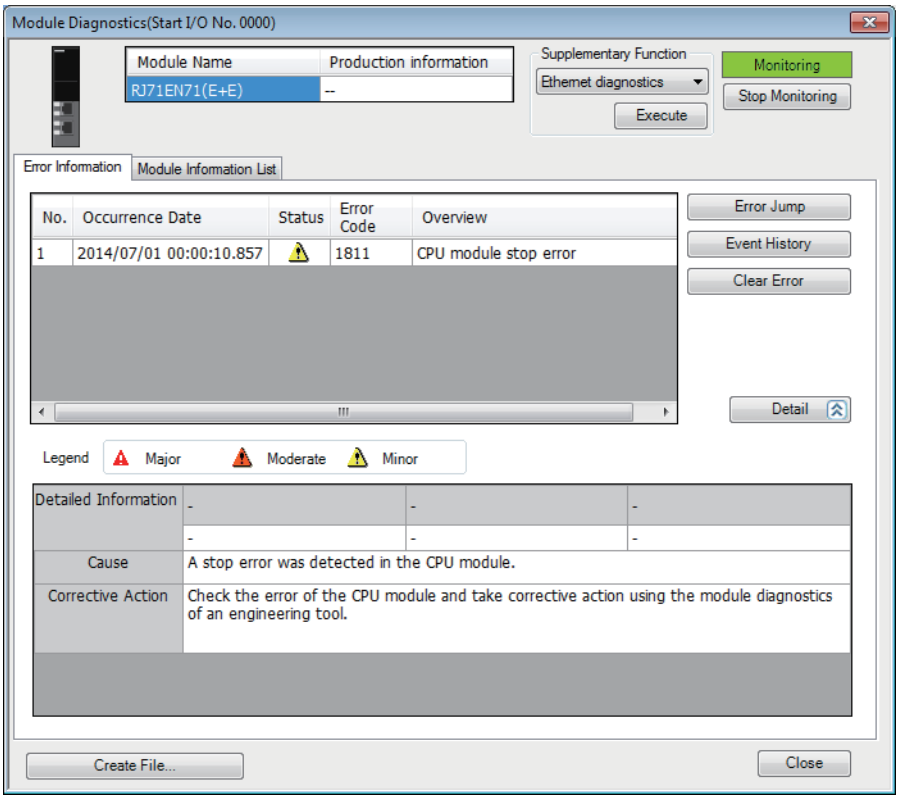
3.2 Checking the Module Status

The following table lists the functions which can be used in the "Module Diagnostics" window of the Ethernet-equipped module.

FUNCTIONS		Applications
Error Information		Displays the details of the errors currently occurring. Click the [Event History] button to check the history of errors that have occurred on the network, errors detected for each module, and operations that have been executed.
Module information list		Displays various status information of the Ethernet-equipped module
Supplementary Function	Ethernet Diagnostics	Enables checking the cause to resolve the problem when an error occurs in the Ethernet system. (☞ Page 154 Checking the Network Status)

Error Information

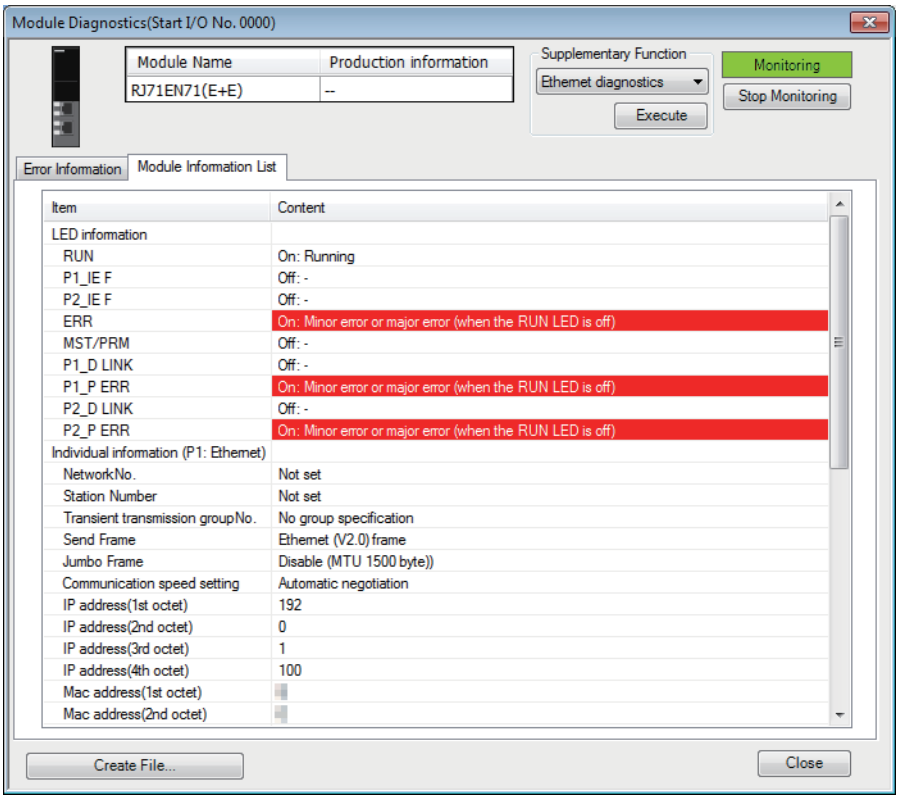
Check the details of the error currently occurring and action to remove the error.



Item	Description
Status	Major: An error such as hardware failure or memory failure. The module stops operating.
	Moderate: An error, such as parameter error, which affect module operation. The module stops operating.
	Minor: An error such as communication failure. The module continues operating.
Detailed Information	Displays detailed information about each error (maximum of 3 pieces).
Cause	Displays the detailed error causes.
Corrective Action	Displays the actions to eliminate the error causes.

Module Information List

Switch to the [Module Information List] tab to check various status information of the Ethernet-equipped module.



Item		Description
LED information		Displays the LED status of the Ethernet-equipped module.
Individual information (P1: Ethernet)*1	Network Number	Displays the network number set for the selected module.
	Station No.	Displays the station number set for the selected module.
	Transient Transmission Group No.	Displays the transient transmission group number set for the selected module.
	Send Frame	Displays the send frame setting set for the selected module.
	Jumbo Frame	Displays the jumbo frame setting set for the selected module.
	Communication Speed	Displays the communication mode set for the selected module.
	IP address (1st octet)	Displays the IP address set for the selected module.
	IP address (2nd octet)	
	IP address (3rd octet)	
	IP address (4th octet)	
	MAC address (1st octet)	Displays the MAC address of the selected module.
	MAC address (2nd octet)	
	MAC address (3rd octet)	
	MAC address (4th octet)	
	MAC address (5th octet)	
	MAC address (6th octet)	
Individual information (P2: Ethernet)*1		(Same as the P1 connector)

*1 This item is displayed when the network type is set to "Ethernet".
For when the network type is set to "CC-Link IE Control", refer to the following.
MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)
For when the network type is set to "CC-Link IE Field", refer to the following.
MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

Module communication test

The module communication test checks the hardware of the RJ71EN71. When the communication using the RJ71EN71 is unstable, whether an hardware failure occurs or not can be checked.

The following list the tests performed.

Test item	Description
Internal self-loopback test	Checks whether the communication function of the module can be performed normally.
External self-loopback test	Checks whether the communication can be performed normally with the cable connected between two connectors.

■Procedure

1. Set the following item of the P1 and P2 to "Module Communication Test".

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Module Parameter] ⇨ [Application Settings] ⇨ [Module Operation Mode]

2. Connect the P1 and P2 of the RJ71EN71 with an Ethernet cable.
3. Write the module parameters to the CPU module.
4. Reset or power off and on the CPU module to start the module communication test.

Point

Do not perform a module communication test while connected to another station. The operation of another station may failed.

■Checking the status and result of module communication test.

The test status and result can be checked with the dot matrix LED of the module.

Test status	LED display
Test in progress	The dot matrix LED displays "UCT".
Normal completion	The dot matrix LED displays "OK".
Abnormal end	The ERR LED turns on and the dot matrix LED displays "ERR" and error number alternately at intervals of 1 second.

■Error number when the test abnormally ended.

The dot matrix LED displays the error number with the form of "Target Ethernet port Error number".

For example, "1 3" is displayed when error No.3 occurs in P1.

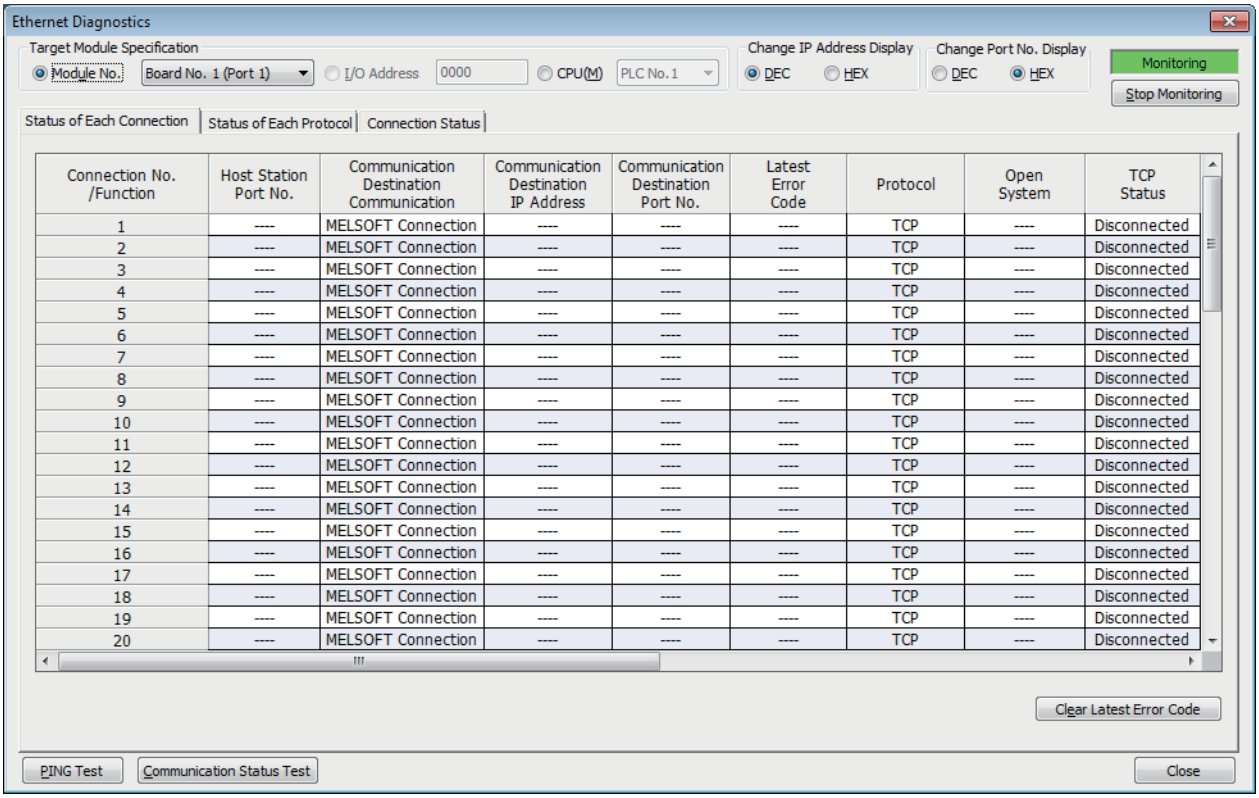
If the module communication test fails, take the following actions.

Error number	Description	Action
1	Internal self-loopback test failure	Please consult your local Mitsubishi representative.
2	External self-loopback test connection error	Check the Ethernet cable connection or replace the Ethernet cable, and perform the test again. If the test fails again, Please consult your local Mitsubishi representative.
3	External self-loopback test communication error	Replace the Ethernet cable and perform the test again. If the test fails again, Please consult your local Mitsubishi representative.

3.3 Checking the Network Status

The communication status of the Ethernet-equipped module and external device can be checked with Ethernet diagnostics.

[Diagnostics] ⇨ [Ethernet Diagnostics]

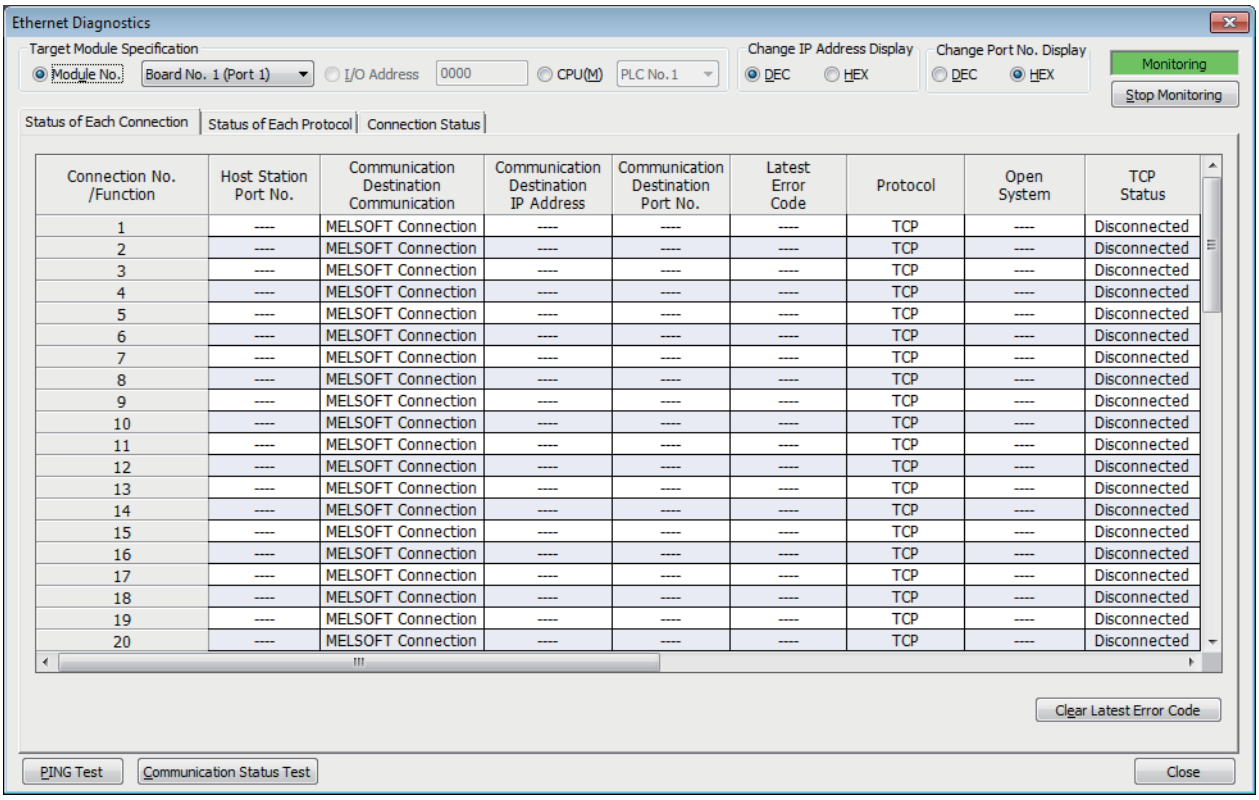


Connection No. /Function	Host Station Port No.	Communication Destination Communication	Communication Destination IP Address	Communication Destination Port No.	Latest Error Code	Protocol	Open System	TCP Status
1	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
2	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
3	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
4	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
5	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
6	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
7	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
8	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
9	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
10	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
11	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
12	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
13	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
14	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
15	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
16	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
17	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
18	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
19	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected
20	----	MELSOFT Connection	----	----	----	TCP	----	Disconnected

Set the Ethernet-equipped module to be diagnosed in "Target Module Specification".

Status of Each Connection

The status of each connection of the Ethernet-equipped module selected.


Ethernet Diagnostics
Target Module Specification
Module No.
Board No. 1 (Port 1)
I/O Address
0000
CPU(M)
PLC No.1
Change IP Address Display
DEC
HEX
Change Port No. Display
DEC
HEX
Monitoring
Stop Monitoring
Status of Each Connection
Status of Each Protocol
Connection Status
Connection No. /Function
Host Station Port No.
Communication Destination Communication
Communication Destination IP Address
Communication Destination Port No.
Latest Error Code
Protocol
Open System
TCP Status
1 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
2 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
3 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
4 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
5 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
6 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
7 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
8 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
9 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
10 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
11 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
12 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
13 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
14 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
15 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
16 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
17 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
18 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
19 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
20 ---- MELSOFT Connection ---- ---- ---- TCP ---- Disconnected
Clear Latest Error Code
PING Test
Communication Status Test
Close

The following table lists the displayed items in "Status of Each Connection" tab.

Item	Description
Connection No./Function	Displays the connection number and functions (FTP server, MELSOF direct connection).
Host Station Port No.	Displays the own station port number used.
Communication Destination Communication*2	Displays the communication method.
Communication Destination IP Address	Displays the IP address of the sensor/device to be connected, which is set in the parameter settings.
Communication Destination Port No.	Displays the port number of the sensor/device to be connected, which is set in the parameter settings.
Latest Error Code	Displays the error code that indicates the definition of latest error occurred.
Protocol	Displays the protocol (TCP/IP or UDP/IP)
Open System	Displays the open method (Active, Unpassive, or Fullpassive) when the protocol of the connection is TCP/IP.
TCP Status	Displays the status (open status) of connection with the sensor/device when the protocol of the connection status is TCP/IP.
Pairing Open*1	Displays the setting status of pairing open when the communication method of the connection is the fixed buffer.
Existence Confirmation*1	Displays the alive check method set in the parameter settings.
Remote Password Status	Displays the remote password setting status.
Continuous Unlock Lost Counts	Displays the total number of continuous failure of remote password unlock.
Force Deactivation Status	Displays the status of forced invalidation specification.

*1 This item is displayed only for the RJ71EN71.

*2 This item is displayed only when the network type of the RJ71EN71 is set to "Q Compatible Ethernet" and "MELSOFT Connection Module" is set as an external device in "External Device Configuration" of "Basic Settings".

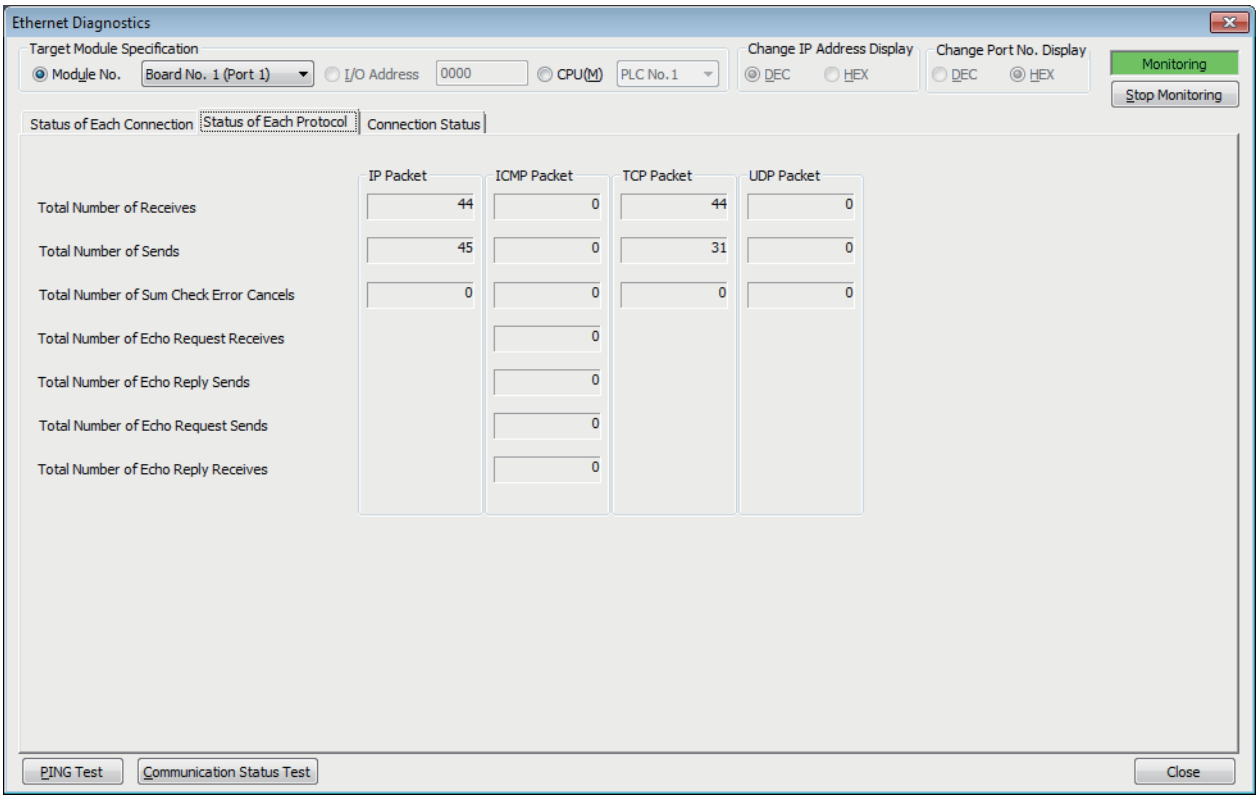
Click the [Clear Latest Error Code] button to clear all the errors displayed in "Latest Error Code" of each connection.

Point

Information about connection No.17 to 64, FTP server, MELSOFT direct connection are not displayed when "Q Compatible Ethernet" is set in the network type of the RJ71EN71.

Status of Each Protocol

The total number of packets sent/received by each protocol of the selected Ethernet-equipped module can be checked.

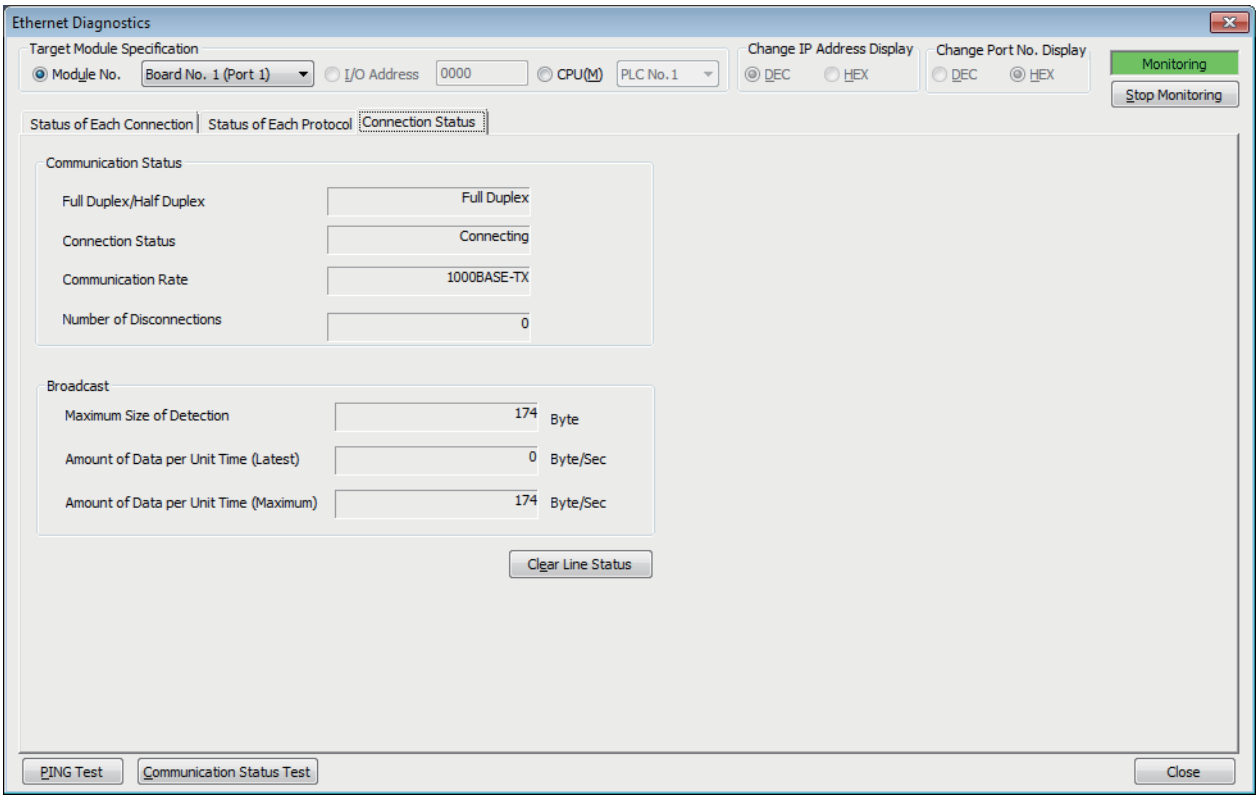


The following table lists the displayed items in "Status of Each Protocol" tab.

Item	Description	Display range
Total Number of Receives	Displays the total number of received packets.	0 to 4294967295
Total Number of Sends	Displays the total number of sent packets.	0 to 4294967295
Total Number of Sum Check Error Cancels	Displays the number of times the received packet was discarded due to checksum error.	0 to 4294967295
Total Number of Echo Request Receives	Displays the total number of received ICMP echo request packets.	0 to 4294967295
Total Number of Echo Reply Sends	Displays the total number of sent ICMP echo replay packets.	0 to 4294967295
Total Number of Echo Request Sends	Displays the total number of sent ICMP echo request packets.	0 to 4294967295
Total Number of Echo Reply Receives	Displays the total number of received ICMP echo reply packets.	0 to 4294967295

Connection Status

The communication status of the Ethernet-equipped module.



The following table lists the displayed items in "Connection Status" tab.

Item		Description	Display range
Communication Status	Full Duplex/Half Duplex	Displays whether the line is full-duplex or half-duplex.	—
	Connection Status	Displays the cable connection status.	—
	Communication Rate	Displays the communication speed.	—
	Number of Disconnections	Displays the number of times the line entered a state where communication cannot be performed.	0 to 65535
Broadcast	Maximum Size of Detection	Displays the maximum size of discarded broadcast messages.	0 to 65535
	Amount of Data per Unit Time (Latest)	Displays the size (latest value) per second of discarded broadcast messages.	0 to 4294967295
	Amount of Data per Unit Time (Maximum)	Displays the size (maximum value) per second of discarded broadcast messages.	0 to 4294967295

Click the [Clear Line Status] button to clear all the data in "Broadcast".

Point

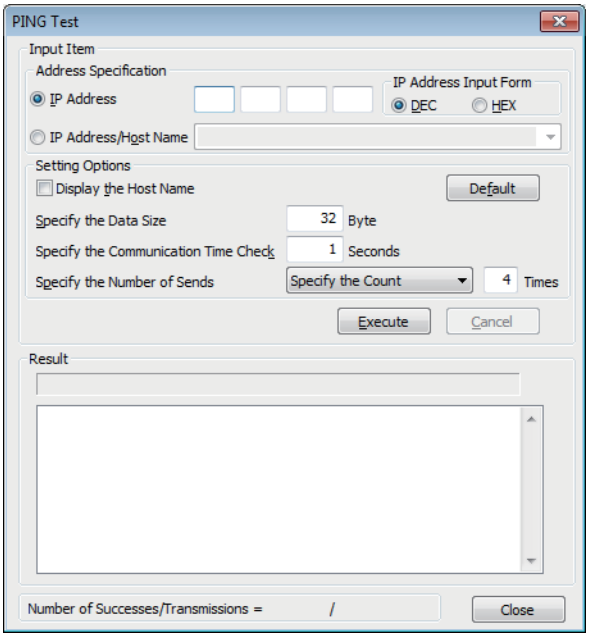
Information of broadcast are not displayed when "Q Compatible Ethernet" is set in the network type of the RJ71EN71.

PING Test

The PING test checks existence of an Ethernet device on the same Ethernet network.

This test is performed on the network of stations connected to the engineering tool by sending packets for check. If a response returns, the communication can be performed.

"Ethernet Diagnostics" window ⇨ [PING Test] button



■Procedure

Set the required items in "Input Item" and click the [Execute] button to execute the PING test. The test results are displayed in the "Result" box.

Point

When executing the PING test from the RJ71EN71 by connecting the engineering tool and CPU module with an USB cable, network number and station number setting is required to specify the PING executing station.

■Action for abnormal end

If the test fails, check the following and perform the test again.

- Whether the Ethernet-equipped module is properly mounted on the base unit
- Connection to the Ethernet network
- Parameter settings written in the CPU module
- Operating status of the CPU module (whether or not an error has occurred)
- IP addresses set in the engineering tool and the PING test target station
- Whether the external device has been reset after the Ethernet-equipped module was replaced

Communication Status Test

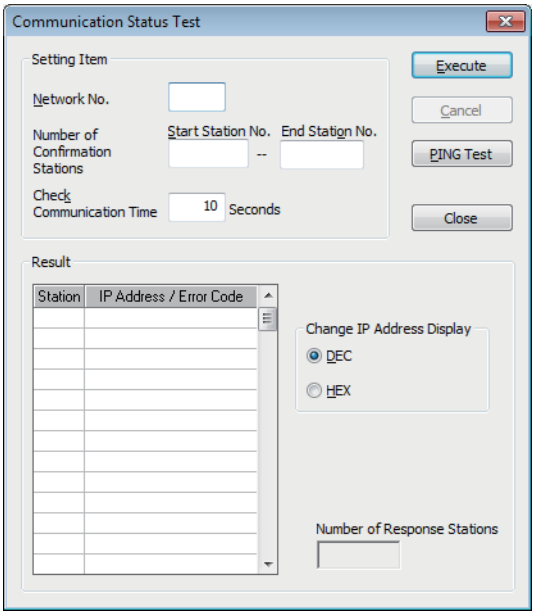
The communication status test checks whether the communication between the own station and the external device on the same Ethernet is operated normally.

The following external devices are the target of communication status test.

- RJ71EN71 (when the Ethernet function is used)
- MELSEC-Q series Ethernet interface module (function version B or later)
- MELSEC-L series Ethernet interface module

This test is performed on the network of stations connected to the engineering tool, by sending the test messages sequentially to specified network and station number range. If the module that received the message returns a response, communication is normal.

"Ethernet Diagnostics" window ⇨ [Communication Status Test] button



Restriction

The communication status test cannot be performed when the Ethernet function of the CPU module is used.

■Procedure

Set the required items in "Setting Item" and click the [Execute] button to execute the communication status test. The test results are displayed in the "Result" box.

■Action for abnormal end

If the communication status test fails, "No Response" or an error code is displayed in the "IP Address / Error Code" field in "Result".

Displayed test result	Status of the external device	Cause	Action
No Response	No error	The initial process for the Ethernet-equipped module has not been completed normally.	Correct the module parameters.
		There is an error in the line connection to the Ethernet-equipped module. (Cable disconnection, line disconnection, or others)	• Check the cable. • Check the hub and gateway.
		The IP address of the Ethernet-equipped module is incorrect. (The class or subnet address differs from that of the Ethernet-equipped module.)	Correct the module parameters.
		The same IP address has been set to multiple Ethernet-equipped modules.	
		The same network number or station number has been set to multiple Ethernet-equipped modules.	
	No error/Error exists	The Ethernet line is heavily loaded.	Perform the test again when the Ethernet line is not heavily loaded.
	Error exists	The routing settings are not configured.	Correct the setting value of the routing settings.
Error code	No error	The "MELSOFT Transmission Port (UDP/IP)" for the Ethernet-equipped module is locked with the remote password.	Disable the remote password setting and write the parameters to the CPU module.
		The target module does not support the communication status test.	Check the module name and function version.
	No error/Error exists	The Ethernet line is heavily loaded.	Perform the test again when the Ethernet line is not heavily loaded.

■Precautions

- The communication status test cannot be executed when "MELSOFT Transmission Port (UDP/IP)" for the target Ethernet-equipped module is locked with the remote password.
- When executing the communication status test, set "Gateway Other Than Default Gateway" under "Gateway Parameter Settings" in "Application Settings" to "Not Use".

3.4 Troubleshooting by Symptom

This section describes troubleshooting method by symptom. If an error has occurred in the Ethernet-equipped module, identify the error cause using the engineering tool. (☞ Page 151 Checking the Module Status)

Communications cannot be performed with the external device.

The following table lists how to troubleshoot the problem when the Ethernet-equipped module cannot communicate with the external device.

Check item	Action
Is the READY LED of the CPU module off?	If the READY LED of the CPU module is off, perform the troubleshooting of the CPU module. (📖 MELSEC iQ-R CPU Module User's Manual (Application))
Is the RUN LED of the RJ71EN71 off?	If the RUN LED of the RJ71EN71 is off, reset the CPU module. If the RUN LED of the RJ71EN71 is still off even after resetting the CPU module, the possible cause is a hardware failure of the RJ71EN71. Replace the RJ71EN71 and restart all the external devices that were performing communications with the own station.*1
Is the Ethernet cable securely connected?	If the Ethernet cable is not securely connected, take following actions. • Securely lock the cable. • Check the wiring. (📖 MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup))
Does the external device conform to the Ethernet standard?	If the device does not conform to the Ethernet standard, replace it with one conforming to the standard. (📖 MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup))
Is the external device powered on?	If the external device is not powered on, power it on.
Does any error occur in the external device, hub, router, or other devices?	If an error occurs, refer to the manual for each device and take action.
Does the protocol (TCP/IP or UDP/IP) match with that of the external device?	Correct the parameters so that the protocol matches with that of the external device. (☞ Page 127 External Device Configuration)
Is the access from the external device set to be denied in "IP Filter Settings" under "Security" of "Application Settings".	If the access from the external device is denied, change the setting so that the access is permitted. (☞ Page 138 IP Filter Settings)
Was a device on the line (such as an Ethernet-equipped module, external device, hub, and router) replaced with the one with the same IP address?	If a device was replaced, take any of the following actions. • Wait for update of the ARP cache (waiting time varies depending on the device) • Restart all the devices on the line.*1
Is the IP address of the external device specified correctly?	Execute a PING test to the IP address of the external device. If the existence of the external device cannot be checked, network configuration is incorrect. Consult with the system or network manager.
Is "Module Operation Mode" of "Application Settings" set to other mode than "Online"?*4	Set "Module Operation Mode" of "Application Settings" to "Online". (☞ Page 148 Module Operation Mode)
Has the initial processing been completed normally? (Check 'Initial status' (Un\G1900024.0))*3	If the initial processing has not been completed successfully, correct the module parameters. (☞ Page 124 PARAMETER SETTINGS)
Does the communication data code (ASCII or binary) setting match with that of the external device?	If the data code settings do not match, data cannot be sent or received because the external device cannot normally decode commands*2 Set the same data code as that of the external device in "Communication Data Code" under "Own Node Settings" of "Basic Settings". (☞ Page 125 Own Node Settings)
Is the target connection in forcibly invalidated state in the "Force Deactivation Status" column in the "Status of Each Connection" tab of the "Ethernet Diagnostics" window?	Turn off the area corresponding to the target connection in 'Forced connection invalidation setting area' (Un\G5646 to Un\G5650) to cancel the forced invalidation.
Is the access from the Ethernet-equipped module denied by the security setting of the external device?	Correct the security setting (such as firewall) of the external device.

When the problem cannot be solved with above actions, check the error cause according to the communication processing and take action.

- Communications using SLMP (☞ Page 164 Communications using SLMP cannot be performed.)
- Communications using the predefined protocol (☞ Page 165 Communications using the predefined protocol cannot be performed.)
- Socket communications/Communications using a fixed buffer (☞ Page 166 Socket communications/communications using a fixed buffer cannot be performed.)
- Communications using the random access buffer (☞ Page 167 Communications using the random access buffer cannot be performed.)
- Communications using the link dedicated instruction (☞ Page 167 Communications using the link dedicated instruction cannot be performed.)
- File transfer function (FTP server) (☞ Page 168 Access using the file transfer function (FTP server) cannot be performed.)

*1 A device on Ethernet has a table of IP addresses and their corresponding MAC address, called "ARP cache". When a device on the line is replaced by the one having the same IP address, the MAC address in the ARP cache is different from that of the replaced device; therefore, communications may not be normally performed. The "ARP cache" is updated by resetting the device or after a while. The time varies depending on the device.

*2 If the communication data code setting is different between the Ethernet-equipped module and the external device, error codes that are not found in the error code list may be returned to the external device. When receiving data with different data codes, the Ethernet-equipped module cannot decode commands normally. The Ethernet-equipped module returns an error response according to the communication data code setting.

*3 The buffer memory address is for when the network type of the RJ71EN71 is set to "Ethernet" and the P1 connector is used. When using the P2 connector or the CPU module, or setting the network type to "Q Compatible Ethernet", refer to the following. ☞ Page 191 Buffer Memory

*4 Check this item only for the modules that have "Module Operation Mode" in the module parameters.

A message sent from the external device cannot be received frequently.

When the Ethernet-equipped module frequently fails to receive a message sent from the external device, check the following items.

Check item	Action
Are there many detected errors in 'Simultaneous transmission error detection count (receive buffer full count)' (Un\G5022 to Un\G5023)? *1	If many errors are detected or a system error is stored, there may be a heavy load on the Ethernet line due to data sending and receiving between connected devices. • Taking action such as separating networks or decreasing the number of data sending reduces the load on the Ethernet line. • Consult with the network manager and reduce the load on the Ethernet line.
Has a system error been stored in 'Latest error code' (Un\G100 to Un\G163 (Connection No.1 to No.64 latest error code))?*1	

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)*2

*1 The buffer memory address is for when the network type of the RJ71EN71 is set to "Ethernet" and the P1 connector is used. When using the P2 connector or the CPU module, or setting the network type to "Q Compatible Ethernet", refer to the following. ☞ Page 191 Buffer Memory

*2 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

Direct connection to the engineering tool is not possible.

When the direct connection to the engineering tool, check the following items.

Check item	Action
Is the Ethernet-equipped module directly connected to the engineering tool with a single cable?	Directly connect the Ethernet-equipped module to the engineering tool with a single cable.
Is "Disable Direct Connection with MELSOFT" under "Security" of "Application Settings" is set to "Disable"?	If "Disable Direct Connection with MELSOFT" is set to "Disable", change the setting to "Enable".
Is the transfer setup setting of the engineering tool correct?	If the setting is incorrect, check the following items. • Check that "Ethernet Board" is selected in "PC side I/F". • Check that "Ethernet Port Direct Connection" is selected in the "PLC side I/F Detailed Setting of PLC Module" window or "PLC side I/F Detailed Setting of Ethernet Module" window of "PLC side I/F". • When "PLC side I/F" is "Ethernet Module", check that "Other Station (Single Network)" is selected for "Other Station Setting" and "Access to Ethernet module set on PLC side I/F" is selected in the "Network Communication Route Detailed Setting of Ethernet" window of "Network Communication Route".
Does a timeout occur when connecting to the engineering tool?	Increase the value for "Check at Communication Time" and "Retry Times" in the "Other Station Detailed Setting" window of "Other Station Setting" and connect again.
Does the device (personal computer) to be connected support the direct connection?	If the device does not support the direct connection, connect a hub.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)*1

*1 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

CPU module search on the network cannot be performed.

When the CPU module search on the network cannot be performed, check the following items.

Check item	Action
Is "Do Not Respond to CPU Module Search" under "Security" of "Application Settings" is set to "Do Not Respond"?	Set "Do Not Respond to CPU Module Search" under "Security" of "Application Settings" to "Respond".
Is the CPU module cannot be searched connected to a router?	The CPU module connected via a router cannot be searched. Modify the connection to search the CPU module.
Is the CPU module cannot be searched connected with wireless LAN?	Perform the search again. (The packet may be lost.)
Is the service processing (such as file read) load of the search target CPU module high?	• Increase the response waiting time and perform the search again. • Reduce the service processing load of the CPU module.

Communications using SLMP cannot be performed.

When communications using SLMP cannot be performed, check the following items.

Check item	Action
Has the connection with the external device been opened? (Check 'Open completion signal' (Un\G1900000 to Un\G1900007)[*1*2]	• If the connection with the external device is not opened, perform the open processing. • If an error occurs, check and eliminate the error cause.
Is the correct command format used for the command type, device, address, and others?	Correct the command format. (📖 SLMP Reference Manual)
Is "Enable/Disable Online Change" under "Own Node Settings" in "Basic Settings" set to "Disable"?	If "Enable/Disable Online Change" is set to "Disable", change the setting to "Enable". (☞ Page 125 Own Node Settings)
Did the external device send a command?	If the device did not send a command, send a command to the Ethernet-equipped module.
Was a response returned to the device that had sent the command?	• If no response was returned, check if the correct IP address was specified in the command. If not, correct the IP address and send the command again. • If a response was returned, check the end and error codes to correct the error.
Is the communication method of the connection used for communication with the external device is set to an item other than "SLMP" in the "External Device Configuration" window of "Basic Settings"?	Correct the communication method setting if an item other than "SLMP" is set. (☞ Page 127 External Device Configuration)

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)[*3]

*1 The buffer memory address is for when the network type of the RJ71EN71 is set to "Ethernet" and the P1 connector is used. When using the P2 connector or the CPU module, or setting the network type to "Q Compatible Ethernet", refer to the following. ☞ Page 191 Buffer Memory

*2 If the connection of only the external device is closed due to cable disconnection, personal computer restart, or other reasons, reopen the connection using the same port used before the error occurred. The E71 does not close a connection if it receives an Active open request again from the external device with a different IP address or a port number.

*3 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

Communications using the predefined protocol cannot be performed.

When communications using the predefined protocol cannot be performed, check the following items and take action.

Check item	Action
Is the IP address setting of the external device correct?	Check and correct the IP address of the external device.
Has the connection with the external device been opened? (Check 'Open completion signal' (Un\G1900000 to Un\G1900007)[*1*2]	• If the connection with the external device is not opened, perform the open processing. • If an error occurs, check and eliminate the error cause.
Has the send/receive processing (dedicated instruction) for the communications using the predefined protocol been executed properly?	• If the send/receive processing has not been executed, check and correct the execution condition of the send/receive processing. • If send/receive processing has completed with an error, check the error code in the completion status and eliminate the error cause.
Is the appropriate protocol used for the external device in the predefined protocol settings and program?	Correct the predefined protocol settings and program If inappropriate protocol is used. For appropriate protocol for the external device, refer to the manual for the device used.
Is the communication method of the connection used for communication with the external device is set to an item other than "Predefined Protocol" in the "External Device Configuration" window of "Basic Settings"?	Correct the communication method setting if an item other than "Predefined Protocol" is set. (☞ Page 127 External Device Configuration)
Is 'Predefined protocol ready' (Un\G1901002.0) on?[*1]	If 'Predefined protocol ready' (Un\G1901002.0) is off, write the protocol setting data to the module.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)[*3]

*1 The buffer memory address is for when the network type of the RJ71EN71 is set to "Ethernet" and the P1 connector is used. When using the P2 connector or the CPU module, or setting the network type to "Q Compatible Ethernet", refer to the following. ☞ Page 191 Buffer Memory

*2 If the connection of only the external device is closed due to cable disconnection, personal computer restart, or other reasons, reopen the connection using the same port used before the error occurred. The E71 does not close a connection if it receives an Active open request again from the external device with a different IP address or a port number.

*3 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

Socket communications/communications using a fixed buffer cannot be performed.

When socket communications or communications using a fixed buffer cannot be performed, check the following items and take action.

Check item	Action
Has the connection with the external device been opened? (Check 'Open completion signal' (Un\G1900000 to Un\G1900007)[*1*2]	• If the connection with the external device is not opened, perform the open processing. • If an error occurs, check and eliminate the error cause.
Has the send/receive processing been executed properly?	• If the send/receive processing has not been executed, check and correct the execution condition of the send/receive processing. • If send/receive processing has completed with an error, check the error code in the completion status and eliminate the error cause.
Does 'Socket/fixed buffer reception status signal' (Un/G1900016 to Un\G1900023) turn on when receive processing is executed?	• Send data from the external device. • If data has been sent, check that the destination address (IP address and port number) is correctly set.
Is the communication method of the connection used for communication with the external device is set to an item other than the following in the "External Device Configuration" window of "Basic Settings"? • Socket communications: "Socket Communication" • Communications using a fixed buffer: "Fixed Buffer (Procedure Exist)" or "Fixed Buffer (No Procedure)"	Correct the communication method setting if an item other than the one described in the left is set. (☞ Page 127 External Device Configuration)
Is the communication method of the connection used for communication with the external device is set to an item other than "Broadcast Send" or "Broadcast Receive" in the "External Device Configuration" window of "Basic Settings" when broadcast communications is performed?	Correct the communication method setting if an item other than the one described in the left is set. (☞ Page 127 External Device Configuration)

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)[*3]

*1 The buffer memory address is for when the network type of the RJ71EN71 is set to "Ethernet" and the P1 connector is used. When using the P2 connector or the CPU module, or setting the network type to "Q Compatible Ethernet", refer to the following. ☞ Page 191 Buffer Memory

*2 If the connection of only the external device is closed due to cable disconnection, personal computer restart, or other reasons, reopen the connection using the same port used before the error occurred. The E71 does not close a connection if it receives an Active open request again from the external device with a different IP address or a port number.

*3 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

Communications using the random access buffer cannot be performed.

When communications using the random access buffer cannot be performed, check the following items and take action.

Check item	Action
Has the connection with the external device been opened? (Check 'Open completion signal' (Un\G1900000 to Un\G1900007)*1*2	• If the connection with the external device is not opened, perform the open processing. • If an error occurs, check and eliminate the error cause.
Did the external device send a command?	Send a command to the Ethernet-equipped module from the external device.
Is the correct buffer memory address specified for the command?	If the specified buffer memory address is incorrect, correct it and send the command again.
Has data been set in the specified address of the random access buffer?	If any data has not been set, write the data.
Has the write data been set in the external device?	If any write data has not been set, set the data.
Was a response returned to the device that had sent the command?	• If no response was returned, check if the correct IP address was specified in the command. If not, correct the IP address and send the command again. • If a response was returned, check the end and error codes to correct the error.
Is the communication method of the connection used for communication with the external device is set to an item other than "Random Access Buffer" in the "External Device Configuration" window of "Basic Settings"?	Correct the communication method setting if an item other than "Random Access Buffer" is set. (☞ Page 127 External Device Configuration)

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)

*1 The buffer memory address is for when the network type of the RJ71EN71 is set to "Ethernet" and the P1 connector is used. When using the P2 connector or the CPU module, or setting the network type to "Q Compatible Ethernet", refer to the following. ☞ Page 191 Buffer Memory

*2 If the connection of only the external device is closed due to cable disconnection, personal computer restart, or other reasons, reopen the connection using the same port used before the error occurred. The E71 does not close a connection if it receives an Active open request again from the external device with a different IP address or a port number.

A dedicated instruction is not completed.

If the dedicated instruction is not completed when using the RJ71EN71, check if the following item is set to an item other than "Online".

Set "Online".

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71EN71] ⇨ [Module Parameter] ⇨ [Application Settings] ⇨ [Module Operation Mode]

Communications using the link dedicated instruction cannot be performed.

When communications using the link dedicated instruction cannot be performed, check the following items and take action.

Check item	Action
Are the network number and station number set in the Ethernet-equipped module?	Set the network number and station number.
Is the number of resends set upon every instruction execution?	Modify the program to set the number of resends upon every instruction execution.
Are station numbers unique?	Change the duplicated station number.
Is the network number overlapped on the network?	Correct the parameters so than the network number is not overlapped.
Is a communication path by the dynamic routing function is determined?	• Power on the system and start transient transmission after a while. • When "Dynamic Routing" under "Application Settings" of the station on the communication path is set to "Disable", change it to "Enable".
Does the relay station to be passed support the dynamic routing function?	If the relay station to be passed does not support the dynamic routing function, set all the stations on the communication path in "Routing Setting" of the CPU parameters.
Are multiple link dedicated instructions with same channel setting executed simultaneously?	• Set different channel to each instructions. • Shift the execution timing of the link dedicated instructions.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)

Access using the file transfer function (FTP server) cannot be performed.

When the Ethernet-equipped module cannot be accessed from the external device (FTP client) using the file transfer function (FTP server), check the following items and take action.

Check item	Action
Is the file transfer function (FTP server) for the Ethernet-equipped module enabled ?	Set "FTP Server" under "FTP Server Settings" of "Application Settings" to "Use". (☞ Page 133 FTP Server Settings)
Are the login name and password correct?	Check the login name and password set in the parameters, and log in again. (☞ Page 133 FTP Server Settings)
Is the IP address entered at login correct?	Check the IP address of the Ethernet-equipped module set in the parameters, and log in again. (☞ Page 126 IP Address)
Is executed command used properly?	Check the instructions of the command and use the command properly. (☞ Page 102 FTP command)
In multiple CPU system, is the access destination CPU module correct?	Execute the cpuchg command and change the access destination CPU module.

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)*1

*1 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

The time setting function (SNTP client) cannot be performed normally.

When the time setting function (SNTP client) cannot be performed normally, check the following items and take action.

Check item	Action
Is the time setting function (SNTP client) is enabled for the Ethernet-equipped module?	Set "Time Setting (SNTP Client)" under "Time Setting" of "Application Settings" to "Use". (☞ Page 134 Time Setting)
Is "SNTP Server IP Address" set correctly?	Change the "SNTP Server IP Address" under "Time Setting" in "Application Settings" to the correct IP address. (☞ Page 134 Time Setting)

If the above action does not solve the problem, perform the module communication test to check for hardware failure. (☞ Page 153 Module communication test)*1

*1 The module communication test cannot be performed for the CPU module. Perform the troubleshooting of the CPU module and check for hardware failure. (📖 MELSEC iQ-R CPU Module User's Manual (Startup))

The access cannot be allowed/permitted correctly by the IP filter.

When the access cannot be allowed/permitted correctly by the IP filter, check the following items and take action.

Check item	Action
Is "Access from IP address below" correctly set in "IP Filter Settings" under "Security" of "Application Settings"?	Correct the setting of "Access from IP address below".
Are the IP addresses set in "IP Address" in "IP Filter Settings" under "Security" of "Application Settings"?	Correct the IP addresses. When the IP addresses are specified by range, check also the IP addresses to be excluded from the range.
Is the IP address of the proxy server set to be allowed?	Set the IP address of the proxy server to be denied.

Remote password does not work.

When the remote password does not work, check the following items and take action.

Check item	Action
Is the remote password setting of the target connection disabled in the "Remote Password Detail Setting" window?	If the remote password is disabled, change the setting so that it is enabled. (☞ Page 114 Remote password)

3.5 List of Error Codes

This section lists the error codes, error details and causes, and action for the errors occur in the processing for data communication between the Ethernet-equipped module and slave stations or caused by processing requests from the CPU module on the own station.

Error codes are classified into major error, moderate error, and minor error, and can be checked in "Error Information" in the "Module Diagnostics" window. (☞ Page 151 Error Information)

Error code	Error details and causes	Action	Detailed information
1080H	The number of writes to the flash ROM has exceeded 100000.	Replace the module.	—
1120H	Clock setting has failed when the system is powered on or the CPU module is reset.	• Check if the time settings are correctly set in parameter. • Check if the specified SNTP server is operating normally and there is no failure on the network accessing to the SNTP server computer.	—
1124H	• The default gateway is not set correctly. • The gateway IP address is not set correctly. • The default gateway/gateway IP address (network address after the subnet mask) is different from that of the IP address of the own node.	• Correct the default gateway IP address. • Set the same network address as that of the IP address.	Parameter information • Parameter type • I/O No. • Parameter No. • Network No. • Station No.
1128H	The port number is incorrect.	Correct the port number.	—
1129H	The port number of the external device is not set correctly.	Correct the port number of the external device.	—
112DH	The data was sent to the external device while the IP address setting of the device set in the external device configuration is incorrect.	• Correct the IP address of the external device in the external device configuration. • Check that the IP address class of the external device in external device configuration is set to A/B/C.	—
112EH	A connection could not be established in the open processing.	• Check the operation of the external device. • Check if the open processing has been performed in the external device. • Correct the port number of the Ethernet-equipped module, IP address/port number of the external device, and opening method. • When the firewall is set in the external device, check if the access is permitted. • Check if the Ethernet cable is disconnected.	—
1133H	The response send failed during socket communications or communications using a fixed buffer.	• Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
1134H	A TCP ULP timeout error has occurred in the TCP/IP communication. (The external device does not send an ACK response.)	• Check the operation of the external device. • Correct the TCP ULP timeout value of the Ethernet-equipped module. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected.	—
1152H	• The IP address is not set correctly. • The port 1 and port 2 IP addresses of the Ethernet-equipped module are duplicated.	• Correct the IP addresses. • Set different IP addresses for port 1 and port 2.	Parameter information • Parameter type • I/O No. • Parameter No. • Network No. • Station No.
1155H	• The specified connection was already closed in TCP/IP communications. • Open processing is not performed.	• Perform the open processing for the specified connection. • Check if the open processing has been performed in the external device.	—

Error code	Error details and causes	Action	Detailed information
1157H	• The specified connection was already closed in UDP/IP communications. • Open processing is not performed.	• Perform the open processing for the specified connection. • Check if the open processing has been performed in the external device.	—
1165H	Data was not sent correctly with UDP/IP.	• Check the settings for connection with the external device. • Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the PING test and communication status test, and if the test was completed with an error, take the corrective action.	—
1166H	Data was not sent correctly with TCP/IP.	• Check the settings for connection with the external device. • Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the PING test and communication status test, and if the test was completed with an error, take the corrective action.	—
1167H	Unsent data found, but could not be sent.	• Check the settings for connection with the external device. • Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the PING test and communication status test, and if the test was completed with an error, take the corrective action.	—
1801H	IP address of the external device could not be acquired.	• Correct the IP address in the network/station number <-> IP information setting. • Check if the network or station number of the external device is correctly specified by using control data of the dedicated instruction.	Parameter information • Parameter type • I/O No. • Parameter No. • Network No. • Station No.
1811H	An error was detected in the CPU module.	Check the error of the CPU module and take action using the module diagnostics of the engineering tool.	—
1830H	Number of reception requests of transient transmission (link dedicated instruction) exceeded upper limit of simultaneously processable requests.	Lower the transient transmission usage frequency, and then perform again.	—
1845H	Too many processings of transient transmission (link dedicated instruction) and cannot perform transient transmission.	Correct the transient transmission execution count.	—
20E0H	The module cannot communicate with the CPU module.	The hardware failure of the CPU module may have been occurred. Please consult your local Mitsubishi representative.	—
2160H	Overlapping IP addresses were detected.	Check and correct the IP addresses.	—
2220H	The parameter setting is corrupted.	Check the detailed information of the error by executing module diagnostics using the engineering tool, and write the displayed parameter. If the error occurs again even after taking the above, the possible cause is a hardware failure of the module. Please consult your local Mitsubishi representative.	Parameter information • Parameter type

Error code	Error details and causes	Action	Detailed information
2221H	The set value is out of the range.	Check the detailed information of the error by executing module diagnostics using the engineering tool, and correct the parameter setting corresponding to the displayed number.	Parameter information • Parameter type • I/O No. • Parameter No. • Network No. • Station No.
2250H	The protocol setting data stored in the CPU module is not for the Ethernet-equipped module.	Write the protocol setting data for the Ethernet-equipped module to the CPU module.	Parameter information • Parameter type
24C0H	An error was detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the error occurs again even after taking the above, the possible cause is a hardware failure of the module, base unit, or extension cable. Please consult your local Mitsubishi representative.	System configuration information • I/O No. • Base No. • Slot No. • CPU No.
24C1H	An error was detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the error occurs again even after taking the above, the possible cause is a hardware failure of the module, base unit, or extension cable. Please consult your local Mitsubishi representative.	System configuration information • I/O No. • Base No. • Slot No. • CPU No.
24C2H	An error was detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the error occurs again even after taking the above, the possible cause is a hardware failure of the module, base unit, or extension cable. Please consult your local Mitsubishi representative.	System configuration information • I/O No. • Base No. • Slot No. • CPU No.
24C3H	An error was detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the error occurs again even after taking the above, the possible cause is a hardware failure of the module, base unit, or extension cable. Please consult your local Mitsubishi representative.	System configuration information • I/O No. • Base No. • Slot No. • CPU No.
24C6H	An error was detected on the system bus.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the error occurs again even after taking the above, the possible cause is a hardware failure of the module, base unit, or extension cable. Please consult your local Mitsubishi representative.	—
3020H	A value of the port number is out of range.	• Check the each system port number registered in the buffer memory. • If the error occurs again even after taking the above, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3040H	Response data of the dedicated instruction cannot be created.	• Increase the request interval. • Decrease the number of request nodes. • Wait for a response to the previous request before sending the next request. • Correct the timeout value.	—
3060H	The send/receive data size exceeds the allowable range.	• Check and change the send data size of the Ethernet-equipped module or the external device. • If the same error code is displayed again, the possible cause is a hardware failure of the error module or CPU module. Please consult your local Mitsubishi representative.	—
3C00H	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C01H	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—

Error code	Error details and causes	Action	Detailed information
3C02H	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C03H	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C0FH	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C10H	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C11H	A hardware failure has been detected.	• Take measures to reduce noise. • Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C13H	A hardware failure has been detected.	Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3C14H	A hardware failure has been detected.	Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module or CPU module. Please consult your local Mitsubishi representative.	—
3C2FH	An error was detected in the memory.	Reset the CPU module, and run it again. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
3E01H	Network type of the own station is unexpected setting.	Rewrite the module parameter using the engineering tool. If the same error code is displayed again, the possible cause is a hardware failure of the error module. Please consult your local Mitsubishi representative.	—
4000H to 4FFFH	Errors detected by the CPU module (MELSEC iQ-R CPU Module User's Manual (Application))		
C001H	• The IP address setting value of the E71 for the initial processing is incorrect. • The setting value of the subnet mask field for the router relay function is incorrect.	• Correct the IP address setting value for the initial processing. • Check if the class of the IP address is set to A/B/C. • Correct the subnet mask setting value for the initial processing.	—
C012H	The port number used in a connection already opened is set. (For TCP/IP)	Correct the port numbers of the Ethernet-equipped module and the external device.	—
C013H	The port number used in a connection already opened is set. (For UDP/IP)	Correct the port numbers of the Ethernet-equipped module and the external device.	—
C015H	The IP address setting value of the external device for the open processing is incorrect.	Correct the specified IP address of the external device of the CONOPEN/OPEN instruction. Set the class to A/B/C.	—
C016H	The open processing of the connection specified for pairing open has been already completed.	• Check that none of the connections targeted for pairing open has been opened. • Correct the combination of modules set for pairing open.	—
C018H	The IP address specified value of the external device is incorrect.	Correct the IP address specified value of the external device.	—
C020H	The send/receive data length exceeds the allowable range.	• Correct the data length to be sent. • When the amount of data to be sent exceeds the limit, divide the data into smaller chunks to send it.	—

Error code	Error details and causes	Action	Detailed information
C021H	An abnormal end response was received for communications using a fixed buffer and random access buffer.	• Check the command/response type of the subheader. • Check the data length setting to be sent. • Check if the communication data code setting of the Ethernet-equipped module meets the binary/ASCII of the message to be sent.	—
C022H	• A response could not be received within the response monitoring timer value. • The connection with the external device was closed while waiting for a response.	• Check the operation of the external device. • Correct the response monitoring timer value of the Ethernet-equipped module. • Check the open status of the connection with the external device.	—
C024H	• Communications using a fixed buffer or communications using a random access buffer were executed when communication method is set to the "Predefined Protocol" connection. • Predefined protocol was executed when communication method is set to "Fixed Buffer (Procedure Exist)" or "Fixed Buffer (No Procedure)" connection.	• Check that there is no error in the connection number specification of the dedicated instruction. • Correct the communication method of the connection with the external device.	—
C025H	There is an error in the usage setting area when starting the open processing by the CONOPEN/OPEN instruction or I/O signals.	• When starting the open by using the CONOPEN/OPEN instruction, correct the usage setting area of the control data. • When starting the open by I/O signals, correct the connection usage setting area of the buffer memory.	—
C026H	An error has occurred when reading/writing/verifying the predefined protocol setting data.	• Check that connection cable with the engineering tool is not disconnected and read/write/verify the predefined protocol setting data again. • Do not write data simultaneously when writing protocol setting data from multiple engineering tools.	—
C027H	Message send of the socket communications has failed.	• Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C028H	Message send of the fixed buffer has failed.	• Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C029H	• Description of control data is not correct. • Open instruction was executed through open settings parameter even though parameters are not set.	• Correct the descriptions of the control data. • Set the open settings parameters. Execute the OPEN instruction through control data.	—
C035H	The existence of the external device could not be checked within the response monitoring timer value.	• Check the operation of the external device. • Correct the timer setting for data communication of the Ethernet-equipped module. • Check if the connection cable is disconnected.	—
C040H	• Not all the data could be received within the response monitoring timer value. • Sufficient data for the data length could not be received. • The remaining part of the message divided at the TCP/IP level could not be received within the response monitoring timer value.	• Correct the data length of the communication data. • The packets may be crowded in the line, so send the data again from the external device after a random time has passed.	—

Error code	Error details and causes	Action	Detailed information
C050H	When "ASCII" has been selected in the communication data code setting of the Ethernet-equipped module, ASCII code data which cannot be converted into binary code data has been received.	Check if ASCII code data which cannot be converted into binary code data has been sent from the external device.	—
C051H	The number of read/write points from/to the device of SLMP message is out of the allowable range in the CPU module (in units of words).	Correct the number of read/write points and send the SLMP message to the Ethernet-equipped module again.	—
C052H	The number of read/write points from/to the device of SLMP message is out of the allowable range in the CPU module (in units of bits).	Correct the number of read/write points and send the SLMP message to the Ethernet-equipped module again.	—
C053H	The number of read/write points from/to the random device of SLMP message is out of the allowable range in the CPU module (in units of bits).	Correct the number of read/write points and send the SLMP message to the Ethernet-equipped module again.	—
C054H	The number of read/write points from/to the random device of SLMP message is out of the allowable range in the CPU module (in units of words, double words).	Correct the number of read/write points and send the SLMP message to the Ethernet-equipped module again.	—
C055H	The read/write size from/to the file data of SLMP message is out of the allowable range.	Correct the read/write size and send the SLMP message to the Ethernet-equipped module again.	—
C056H	The read/write request exceeds the largest address.	Correct the start address or the number of read/write points so that the request does not exceed the largest address and send the data to the Ethernet-equipped module again.	—
C057H	The request data length of the SLMP message does not match with the number of data in the character (a part of text).	Check and correct the text or request data length, and send the SLMP message to the Ethernet-equipped module again.	—
C058H	The request data length of the SLMP message after the ASCII/binary conversion does not match with the number of data in the character (a part of text).	Check and correct the text or request data length, and send the SLMP message to the Ethernet-equipped module again.	—
C059H	The specified command and subcommand of the SLMP message are incorrect	Check that there is no error in the specification of the command and subcommand of the SLMP message.	—
C05AH	The Ethernet-equipped module cannot read/write data from/to the device specified by the SLMP message.	Correct the specification of the device to be read/write and send the SLMP message to the Ethernet-equipped module again.	—
C05BH	The Ethernet-equipped module cannot read/write data from/to the device specified by the SLMP message.	Correct the specification of the device to be read/write and send the SLMP message to the Ethernet-equipped module again.	—
C05CH	The received request data of the SLMP message is incorrect.	Correct the request data and send the SLMP message to the Ethernet-equipped module again.	—
C05DH	The "Monitor Request" command is received before the monitor registration is performed by "Monitor Registration/Clear" command of the SLMP message.	Register the monitoring data using "Monitor Registration/Clear" command and perform monitoring.	—
C05EH	The time between received the SLMP message from the Ethernet-equipped module and returned response from the access destination exceeded the monitoring timer value set in the SLMP command.	• Increase the monitoring timer value. • Check if the access destination is operating normally. • Correct the network number or request destination station number. • If the access destination is a module with a different network number, correct the routing parameter setting. • If the access destination is a module with a different network number, check if the network number is not in use.	—
C05FH	This request cannot be executed to the access destination specified by the SLMP message.	Correct the access destination.	—
C060H	The request details for bit devices of the SLMP message is incorrect.	Correct the request details and send the SLMP message to the Ethernet-equipped module again.	—
C061H	• The request data length of the SLMP message does not match with the number of data in the character (a part of text). • The write data length specified by the label write command is not even byte.	• Check and correct the text or request data length, and send the SLMP message to the Ethernet-equipped module again. • Add the dummy data for one byte, and specify the length by even byte.	—

Error code	Error details and causes	Action	Detailed information
C070H	The device memory cannot be extended for the access destination specified by the SLMP message.	• Correct the SLMP message to read/write data without the device memory set for extension. • Specify the extension of the device memory only for an Ethernet-equipped module mounted station and a R/Q/QnACPU via CC-Link IE Controller Network, MELSECNET/H, or MELSECNET/10.	—
C071H	The number of device points for data read/write set for modules other than a R/Q/QnACPU is out of the range.	Correct the number of read/write points and send the SLMP message to the Ethernet-equipped module again.	—
C072H	The request details of the SLMP message is incorrect. (For example, a request for data read/write in bit units has been issued to a word device.)	• Check if the data can be requested to the access destination. • Correct the request details and send the SLMP message to the Ethernet-equipped module again.	—
C073H	The access destination of the SLMP message cannot issue this request. (For example, the number of double word access points cannot be specified for modules other than a R/Q/QnACPU.)	Correct the request details of the SLMP message.	—
C075H	The request data length for the label access is out of range.	• Correct the number of read/write points and send the SLMP message to the Ethernet-equipped module again. • Correct the label to shorten the label name and send the SLMP message to the Ethernet-equipped module again.	—
C081H	The termination processing for the Ethernet-equipped module that involves the reinitialization processing is in execution, and if communications using data link dedicated instructions have reached cannot be checked.	Finish all the communications to perform the reinitialization processing of the Ethernet-equipped module.	—
C083H	The communication processing was abnormally ended in the link dedicated instruction communications	• Check if the relay station and external station are operating normally. • Check if there is an error with the cable connection between the own station and the external station. • If the line is heavily loaded, reduce the load, and retry the operation. • Increase the number of resends for the link dedicated instructions and execute the operation.	—
C084H	The communication processing was abnormally ended in the link dedicated instruction communications	• Check if the own station/relay station/external station is operating normally. • Check if there is an error with the cable connection between the own station and the external station. • Increase the TCP resend timer value of the Ethernet-equipped module.	—
C085H	The target station's channel specified by the link dedicated instruction SEND is currently in use.	Correct the target station's channel of the SEND instruction.	—
C0B2H	There is no insufficient space in the receive buffer of the relay station or external station for the MELSOFT connection or link dedicated instructions. (Receive buffer full error)	• Increase the request interval and execute the operation. • Do not access through one station using the MELSOFT connection, link dedicated instruction, or SLMP. • Wait for a response to the previous request before sending the next request. • Correct the timer setting value for data communication of the Ethernet-equipped module.	—
C0B3H	A request that cannot be processed was issued from the programmable controller CPU.	• Correct the request details. • Correct the network number or request destination station number.	—
C0B6H	The channel specified by the link dedicated instruction is out of the range.	Correct the channel to a value within the allowable range using each link dedicated instruction.	—
C0BAH	Since the close processing is in execution using the CONCLOSE/CLOSE instruction, a send request cannot be accepted.	Do no perform the send processing during the close processing.	—
C0C4H	The UINI instruction has been executed during communications.	Execute the UINI instruction after closing all connections.	—
C0D0H	The specified data length of the link dedicated instruction is incorrect.	Correct the data length.	—
C0D1H	The number of resends of the link dedicated instruction is incorrect.	Correct the number of resends.	—

Error code	Error details and causes	Action	Detailed information
C0D3H	The number of relay stations to communicate with other networks exceeds the allowable range.	• Check if the specification (network number/station number) for the communication destination is correct. • Check that number of relay stations accessing to the communication destination is 7 or less. • Correct the settings in the Network station number <-> IP information for the stations between the own station and the communication destination.	—
C0D4H	The number of relay stations to communicate with other networks exceeds the allowable range.	• Check if the specification (network number/station number) for the communication destination is correct. • Check that number of relay stations accessing to the communication destination is 7 or less. • Correct the settings in the Network station number <-> IP information for the stations between the own station and the communication destination.	—
C0D5H	The number of retries of the link dedicated instruction is incorrect.	Correct the number of retries.	—
C0D6H	The network number or station number of the link dedicated instruction is incorrect.	Check if the specification (network number/station number) for the communication destination is correct.	—
C0D7H	Data were sent without the initial processing completed.	After normal completion of the initial processing, perform the communications with the external device.	—
C0D8H	The number of specified blocks exceeded the range.	Correct the number of blocks.	—
C0D9H	The specified subcommand of the SLMP message is incorrect.	Correct the subcommand.	—
C0DAH	A response to the PING test could not be received within the time of the communication time check.	• Correct the IP address and host name of the target module where the PING test is executed. • Check that the initial processing of the Ethernet-equipped module where the PING test is executed is completed successfully.	—
C0DBH	The IP address and host name of the target module where the PING test is execute are incorrect.	Correct the IP address and host name of the target module where the PING test is executed.	—
C0DEH	Data could not be received within the specified arrival monitoring time.	• Correct the specified arrival monitoring time. • Correct the channel of the link dedicated instruction. • Check if the sending station and relay station are operating normally.	—
C1A2H	• A response to the request could not be received. • In transient transmission, the number of relay to other networks exceeded seven.	• Check and correct the response waiting time. • Change the system configuration so that the number of relay stations may be seven or less. • For the RECV instruction, execute again after correcting the channels used by own station in the control data. • For the RECV instruction, check that 'RECV execution request' (Un\G5301 b0 to b7) are on.	—
C1A4H	A request or subrequest is incorrect.	Correct the request and subrequest.	—
C1A5H	The specified target station or clear target is incorrect.	Correct the specified the target station or clear target.	—
C1A6H	The specified connection number is incorrect.	Correct the setting value of the connection number.	—
C1A7H	The specified network number is incorrect.	Correct the specified network number.	—
C1A8H	The specified station number is incorrect.	Correct the specified station number.	—
C1A9H	The specified device number is incorrect.	Correct the specified device number.	—
C1AAH	The specified device name is incorrect.	Correct the specified device name.	—
C1ACH	The specified number of resends is incorrect.	Correct the number of resends.	—
C1ADH	The specified data length is incorrect.	Correct the specified data length.	—
C1AFH	The specified port number is incorrect.	Correct the specified port number	—
C1B0H	The open processing of the specified connection has been already completed.	• Do not perform the open processing to a connection already opened. • When communications with the external device cannot be performed, perform the close processing before the open processing.	—
C1B1H	The open processing of the specified connection has not been completed.	After completion of the open processing, perform the communication.	—
C1B2H	The open or close processing using CONOPEN/CONCLOSE/OPEN/CLOSE instruction is being executed in the specified connection.	Execute again after the CONOPEN/CONCLOSE/OPEN/CLOSE instruction is completed.	—

Error code	Error details and causes	Action	Detailed information
C1B3H	Another send or receive instruction is being executed in the specified channel.	• Change the channel number. • Execute again after the send or receive instruction is completed.	—
C1B4H	The specified arrival monitoring time is incorrect.	Set the arrival monitoring time to a value within the allowable range.	—
C1B8H	The RECV instruction was executed for the channel that had not received data.	• Correct the execution condition of the RECV instruction for the channel that had received data. • Correct the specified channel of the RECV instruction.	—
C1B9H	The CONOPEN/OPEN instruction cannot be executed for the specified connection.	Correct the specified connection.	—
C1BAH	The dedicated instruction was executed with the initialization not completed.	Execute the dedicated instruction after the initial processing is completed.	—
C1BBH	The target station CPU type of the link dedicated instruction is incorrect.	Correct the specified target station CPU type.	—
C1BCH	The target network number of the link dedicated instruction is incorrect.	• Execute the link dedicated instruction again after correcting the network number. • When specifying another network station, check if the routing parameters are set correctly.	—
C1BDH	The target station number of the link dedicated instruction is incorrect.	• Execute the link dedicated instruction again after correcting the target station number. • When specifying another network station, check if the routing parameters are set correctly.	—
C1BEH	The command code of the dedicated instruction is incorrect.	• Execute again after correcting the command code at the request source. • If the request source is on another network, check if the routing parameters are set correctly, and take action.	—
C1BFH	The channel used in the dedicated instruction is incorrect.	• Execute again after correcting the used channel within the allowable range at the request source. • If the request source is on another network, check if the routing parameters are set correctly, and take action.	—
C1C0H	The transient data is incorrect.	• Correct the transient data at the request source, and retry the operation. • If the error occurs again even after taking the above, please consult your local Mitsubishi representative.	—
C1C1H	The transient data is incorrect.	• Correct the transient data at the request source, and retry the operation. • If the error occurs again even after taking the above, please consult your local Mitsubishi representative.	—
C1C2H	When the dedicated instruction was executed, data was received twice.	• Check the network status and take corrective action using the Ethernet diagnostics of the engineering tool. • Check if the switching hub and the cables at the request source are connected properly. • If the request source is on another network, check if the routing parameters are set correctly, and take action.	—
C1C4H	The arrival check of the link dedicated instruction was completed with an error.	• Execute link dedicated instruction again after changing the execution type in the control data to "No arrival confirmation". • For the REQ instruction, execute again after correcting request type.	—
C1C5H	A dedicated instruction which the target station does not support was executed.	• Change the target station at the station that executed the SEND instruction. • If the error occurs again even after taking the above, please consult your local Mitsubishi representative.	—
C1C6H	The execution or error completion type of the link dedicated instruction is incorrect.	• Execute again after correcting the execution/abnormal end type in the control data. • If the problem cannot be resolved with the above actions, the possible cause is a hardware failure of the module. Please consult your local Mitsubishi representative.	—

Error code	Error details and causes	Action	Detailed information
C1C7H	The request type of the REQ instruction is incorrect.	• Execute again after correcting the request type of the REQ instruction. • If the problem cannot be resolved with the above actions, the possible cause is a hardware failure of the module. Please consult your local Mitsubishi representative.	—
C1C8H	The channel specified in the dedicated instruction is in use.	Change the channels used by own station or the target station's channel in the control data.	—
C1C9H	The device specification for the ZNRD/ZNWR instruction is not correct.	• Execute again after correcting the device specification for the ZNRD/ZNWR instruction. • If the problem cannot be resolved with the above actions, the possible cause is a hardware failure of the module. Please consult your local Mitsubishi representative.	—
C1CAH	The device specification for the ZNRD/ZNWR instruction is not correct.	• Execute again after correcting the device specification for the ZNRD/ZNWR instruction. • If the problem cannot be resolved with the above actions, the possible cause is a hardware failure of the module. Please consult your local Mitsubishi representative.	—
C1CBH	The transient data is incorrect.	• Correct the transient data at the request source, and retry the operation. • If the error occurs again even after taking the above, please consult your local Mitsubishi representative.	—
C1D2H	The target station IP address of the link dedicated instruction is incorrect.	Execute the link dedicated instruction again after correcting the IP address.	—
C1D3H	The dedicated instruction not supported by the communication method of the connection was executed.	• Check that the dedicated instruction can be executed by the specified communication method. Correct the program when the instruction cannot be executed. • Check that there is no error in the connection specification of the dedicated instruction.	—
C200H	The remote password is incorrect.	Correct the remote password, and unlock/lock the remote password again.	—
C201H	The remote password status of the port used for communications is in the lock status.	After unlocking the remote password, perform communications.	—
C202H	When another station was accessed, the remote password could not be unlocked.	When accessing another station, do not set the remote password on the relay station or access station, or do not execute the remote password check on them.	—
C203H	An error has occurred by checking the remote password.	Correct the remote password, and unlock/lock the remote password again.	—
C204H	The device is different from the one requesting the remote password unlock processing.	Request the lock processing of the remote password from the external device that requested the unlock processing of the remote password	—
C205H	When another station was accessed, the remote password could not be unlocked.	When accessing another station, do not set the remote password on the relay station or access station, or do not execute the remote password check on them.	—
C207H	The file name has too many characters.	Name the file with 255 characters or less.	—
C208H	The password length that is specified during unlock processing or lock processing of the remote password is out of range.	Set the remote password within 6 to 32 characters.	—
C400H	The ECPRTCL instruction was executed when Predefined protocol ready is not completed.	• Execute the ECPRTCL instruction after Predefined protocol ready has turned on. • Execute the ECPRTCL instruction after rewriting the protocol setting data to the Ethernet-equipped module. • If the error occurs again even after taking the above, the possible cause is a hardware failure of the module. Please consult your local Mitsubishi representative.	—
C401H	The protocol number specified by the ECPRTCL instruction is not registered in the Ethernet-equipped module.	• Correct the specified protocol number and execute the instruction again. • Register the protocol specified protocol number to the Ethernet-equipped module.	—
C402H	A error has occurred in the protocol setting data registered in the Ethernet-equipped module and the ECPRTCL instruction cannot be executed.	Correct the protocol setting data and register it again.	—

Error code	Error details and causes	Action	Detailed information
C403H	Multiple dedicated instructions was executed simultaneously.	• Do not execute the dedicated instructions which do not support simultaneous execution. • Correct the specified connection number and execute the dedicated instruction again.	—
C404H	The protocol being executed by the ECPRTCL instruction was canceled.	Check the canceled protocol in the control data of the ECPRTCL instruction (execution count result) and eliminate the cause of the cancellation.	—
C405H	The protocol number specified by the ECPRTCL instruction is incorrect.	Correct the specified protocol number.	—
C406H	The continuous protocol execution count of the ECPRTCL instruction is incorrect.	Correct the continuous protocol execution count.	—
C407H	The connection number specified by the ECPRTCL instruction is incorrect.	• Correct the specified connection number and execute the protocol again. • Correct the specified connection number of the external device in the connection configuration setting of the Ethernet-equipped module and execute the protocol again.	—
C408H	An error has occurred when the send processing of the predefined protocol using the ECPRTCL instruction was performed.	• Check the operation of the external device or switching hub. • Since there may be congestion of packets on the line, send data after a certain period of time. • Check if the connection cable is disconnected. • Check that there is no connection failure with the switching hub. • Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C410H	Receive waiting time of the ECPRTCL instruction timed out.	• Check if the cable is disconnected. • Correct the specified connection number of the external device in the connection configuration setting of the Ethernet-equipped module and execute the protocol again. • Check that there is no error in the external device. • Check that the sending from the external device is not interrupted. • Check that there is no data lost due to a receive error. • Check that there is no error in the data (packet) sent by the external device.	—
C412H	The data which cannot be converted from ASCII to binary code was received.	• Check that there is no data lost due to a receive error. • Check that there is no error in the data (packet) sent by the external device.	—
C413H	The number of digits of the received data using the predefined protocol is not sufficient.	• Check that there is no data lost due to a receive error. • Check that there is no error in the data (packet) sent by the external device.	—
C414H	The number of digits of the received data using the predefined protocol is incorrect.	• Check that there is no data lost due to a receive error. • Check that there is no error in the data (packet) sent by the external device.	—
C417H	The data length or data quantity of the received data using the predefined protocol is out of range.	• Check the maximum allowable data length and specify the maximum length or less in the data length storage area. • Check the maximum allowable data quantity, and specify the maximum quantity or less in the data quantity storage area.	—
C420H	Protocol setting data write has failed.	• Write the data again. • If the error occurs again even after taking the above, the possible cause is a hardware failure of the specified module. Please consult your local Mitsubishi representative.	—
C421H	Writing was requested to the module whose flash ROM write count had exceeded the limit.	Replace the module because the number of writes exceeded the limit.	—
C430H	Protocol setting data was written during the ECPRTCL instruction execution.	Do not write the protocol setting data during the ECPRTCL instruction execution.	—

Error code	Error details and causes	Action	Detailed information
C431H	Close processing of the connection was performed during the ECPRTCL instruction execution.	• Check the operation of the external device. • Check the connection open status with the external device. • Open the connection with the external device again and execute the instruction.	—
C440H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C441H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C442H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C443H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C444H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C445H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C446H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C447H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C448H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C449H	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C44AH	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C44BH	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C44CH	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C44DH	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C44EH	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—

Error code	Error details and causes	Action	Detailed information
C44FH	A communication error has occurred with an engineering tool when executing the Ethernet diagnostics.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C610H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C611H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C612H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C613H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C614H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C615H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C700H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C701H	The IP address (network number) setting is incorrect in communications using the IP packet transfer function.	Check the IP address (network number).	—
C702H	The IP address (station number) setting is incorrect in communications using the IP packet transfer function.	Check the IP addresses (station number).	—
C703H	The destination IP address (upper level) setting is incorrect in communications using the IP packet transfer function.	Check the destination IP address.	—
C704H	The destination IP address (lower level) setting is incorrect in communications using the IP packet transfer function.	Check the destination IP address.	—
C705H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C706H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C707H	The module processing was completed with an error.	• Execute the communication status test, and if the test was completed with an error, take the corrective action. • Execute the module communication test, and check that there is no failure in the module.	—
C708H	IP packet transfer function of the Ethernet-equipped module connected with the Ethernet devices is set to "Not Use" when communicating with the IP packet transfer function.	When communicating with the IP packet transfer function, set the IP packet transfer setting to "Use"	—
C709H	A communication error has occurred with MELSOFT direct connection.	• Do no execute the specification of the direct connection when direct connection is not used. • Do not power off the system or reset the CPU module, or remove the cable during the communications when direct connection is used.	—

Error code	Error details and causes	Action	Detailed information
C810H	Remote password authentication has failed when required.	Set a correct password and perform password authentication again.	—
C811H	Remote password authentication has failed when required.	Set a correct password and perform password authentication again one minute later.	—
C812H	Remote password authentication has failed when required.	Set a correct password and perform password authentication again 5 minutes later.	—
C813H	Remote password authentication has failed when required.	Set a correct password and perform password authentication again 15 minutes later.	—
C814H	Remote password authentication has failed when required.	Set a correct password and perform password authentication again 60 minutes later.	—
C815H	Remote password authentication has failed when required.	Set a correct password and perform password authentication again 60 minutes later.	—
C816H	The security function was activated and remote password authentication cannot be performed.	Set a correct password and perform password authentication again after a certain period of time.	—
C840H	Number of transient request exceeded the upper limit of simultaneously processable requests.	• Pause the transient transmission temporarily, and retry the operation. • Lower the transient transmission usage frequency, and then perform again.	—
C842H	The routing setting is not set to reach to the destination network number.	• Execute the link dedicated instruction again after correcting the target network number and station number. • When the dynamic routing is used, check that communication path to the destination network number is set. • When the dynamic routing is not used, or the module of the series other than MELSEC iQ-R is included, retry the operation after correcting the routing setting.	—
C843H	Link dedicated instruction that cannot be executed on the network type were executed.	Check the network type of the Ethernet-equipped module.	—
C844H	Incorrect frame is received. • Unsupported pre-conversion protocol • Unsupported frame type • Application header variable part • Application header HDS • Application header RTP • Read command not requiring response	Correct the request data at the transient request source, and retry the operation.	—

3.6 List of Parameter Numbers

This section lists the parameter numbers displayed in the module diagnostics.

Item				Parameter No.
Basic Settings	Own Node Settings	Parameter Setting Method		7100H
		IP Address	IP Address	A012H
			Subnet mask	A012H
			Default Gateway	A013H
		Communications by Network No./Station No.		7100H
		Setting Method		7100H
		Network Number		7100H
		Station No.		7100H
		Transient Transmission Group No.		A010H
		Enable/Disable Online Change		A030H
		Communication Data Code		A031H
		Opening Method		A031H
	External Device Configuration			A031H
Application Settings	Frame Settings			A036H
	Communication Speed			7100H
	FTP Server Settings			A037H
	Time Setting			A039H
	Timer Settings for Data Communication			A038H
	Security	IP Filter Settings		A03AH
		Disable Direct Connection with MELSOFT		A034H
		Do Not Respond to CPU Module Search		A034H
	Gateway Parameter Settings			A013H
	Network/Station No. <-> IP information setting			A033H
	Interrupt Settings	Interrupt Occurrence Factor		A014H
		Channel No./Connection No.		A014H
		Detection Method		A014H
		Interrupt Pointer		A014H
		Comment		A015H
	IP Packet Transfer Setting			A030H
	Network Dynamic Routing			A030H
	Module Operation Mode			7100H

3.7 Event List

This section lists the events occurs in Ethernet.

Event code	Event type	Description	Cause
00100	System	Link-up	Link-up has occurred when the network cable connected to the external device was connected.
00110		TCP connection communication start/end	Communication using the TCP connection with the external device was started or ended.
00120		FTP connection start/stop	FTP connection was started from the external device or disconnected.
00130		Receive frame error	• Receive frame error was detected. • The Ethernet-equipped module was connected to the CC-Link IE Controller Network or CC-Link IE Field Network.
00140		Time synchronization failure	No response was returned from the time information server (SNTP server) and time synchronization has failed.
00400		Restart by a program	The module was restarted by the program.
00800		Link-down	Link-down has occurred when network cable connected to the external device was disconnected.
00901		Data length error	The send/receive data length exceeds the allowable range.
00902		Initial processing error	Socket communications or communications using a fixed buffer were executed before the initial processing was completed.
00903		Specification IP address error	Broadcast address was specified to the IP address of the external device other than Unpassive.
00904		Socket communications transmission failed	Message send of the socket communications has failed.
00905		Not opened	• The open processing of the external device has not been completed. • The connection with the external device is closed.
00906		Alive check error	The existence of the external device could not be checked within the response monitoring timer value.
00907		Divided messages receive timeout error	• Not all the data could be received within the response monitoring timer value. • Sufficient data for the data length could not be received. • The remaining part of the message divided at the TCP/IP level could not be received within the response monitoring timer value.
00908		IP assembly timeout error	An IP assembly timeout error has occurred. (The remaining part of the divided data could not be received and a timeout has occurred.)
00909		TCP specification port number error	The port number used in a connection already opened is set. (For TCP/IP)
0090A		UDP specification port number error	The port number used in a connection already opened is set. (For UDP/IP)
00C02		Access abnormal response of another station	• Abnormal response was returned from another station when accessing another station. • Abnormal response was returned to another station when accessed from another station.
00D00		Fixed buffer response send failed	Response send of the communications using a fixed buffer has failed.
00D01		Pairing open error	The open processing of the connection specified for pairing open has been already completed.
00D02		End code error	An abnormal end response was received for communications using a fixed buffer and random access buffer.
00D03		Response monitoring timeout error	• A response could not be received within the response monitoring timer value. • The connection with the external device was closed while waiting for a response.
00D04		Fixed buffer send failed	Message send of the fixed buffer has failed.
00D05		Random access communication error	The parameter (start address and data word) of the data received by the random access communication is faulty.

Event code	Event type	Description	Cause
10200	Security	Remote password lock	The lock processing of the remote password was performed.
10201		Remote password unlock successful	The unlock processing of the remote password was succeeded.
10202		Remote password unlock failed	The unlock processing of the remote password has failed.
10300		Access from IP restricted with IP filter setting	Accessed from IP address restricted with the IP filter setting.
10500		Forced invalidation setting	Forced invalidation setting was executed.
10501		Forced invalidation cancel	Forced invalidation setting was canceled.
24E00	Operation	ERR LED off execution	The ERR LED has turned off using the output signal Y17 of the module.

3.8 End Codes Returned to an External Device During Data Communications

The following table lists the error codes stored in the end code appended to a response during data communications.

End code	Error details and causes	Action
00H	Normal completion	When each communication is normally completed, the error code 00H is stored.
02H	The device range destination of devices to be read/written from/to is incorrect.	Check and correct the specified start device and the number of points.
50H	• Codes for the command/response type of a subheader are not within the specifications. • In communications using a fixed buffer, if the data length setting is smaller than the actual data amount, the remaining data is processed as the second data. In this case, a subheader undefined command type error may occur.	• Check and correct the command/response type set for the external device. (Because the Ethernet-equipped module automatically adds the command/response type, the user setting is not required.) • Check and correct the data length.
51H	In communications using the random access buffer, the start address specified by an external device has been set outside the range from 0 to 6143.	Check and correct the specified start address.
52H	• In communications using the random access buffer, the start address and the number of data words (depending on the setting when reading data) specified by an external device exceeds the range from 0 to 6143. • Data by the number of words specified (text) cannot be sent in one frame. (The data length value or the amount of the text sent/received are not in the allowable range.)	• Check and correct the start address and the number of data words. • Correct the number of read/write points.
54H	When "ASCII" has been selected in the "Communication Data Code" under "Own Node Settings" of "Basic Settings" of the module parameters for Ethernet-equipped module, ASCII code data which cannot be converted into binary code data has been sent from the external device.	Check and correct the data sent from the external device.
55H	• When "Disable All (SLMP)" has been selected in "Enable/Disable Online Change" under "Own Node Settings" of "Basic Settings" of the module parameters for Ethernet-equipped module, the external device requested a data write while the CPU module was running. • While the CPU module was running, the external device requested for writing a parameter or program.	• Set the "Enable All (SLMP)" to the "Enable/Disable Online Change" under "Own Node Settings" of "Basic Settings" of the module parameters for Ethernet-equipped module, and write data. (However, a parameter, program, or microcomputer program cannot be written while the CPU module is running.) • Set the switch on the CPU module to STOP and write the data.
56H	The external device specified an incorrect device.	Correct the device specification.
57H	• The number of points for a command specified by an external device exceeds the maximum number of processing points (number of processes that can be executed per communication) for each process. • Addresses from the start address (start device number and start step number) to the specified number of points exceed the largest addresses (device number and step number) for each process. • The byte length of a command is not within the range defined by the specifications. • When data is written, the set number of write data points is different from the specified number of points. • A monitor request was issued even though monitoring data is not registered.	• Correct the specified points or the start address (device number and step number). • Check the data length of the command and set the data again. • Register the monitoring data. • Data cannot be read from/written to an area with an address after the last address. Correct the specified address. • Correct the block number. • In the block number specification of the extension file register, do not specify a block number exceeding the range of the corresponding memory cassette size.
58H	• The start address (start device number and start step number) of a command specified by an external device has been set outside the range that can be specified. • For data read/write in a microcomputer program or file register, values exceeding the CPU module parameter setting range has been specified. • A block number specified for an extension file register does not exist. • A file register cannot be specified. • A word device has been specified for the command for bit devices. • The start number of bit devices has been specified using a value other than a multiple of 16 in the command for word devices.	• Correct the value to the one within the range that can be specified for each process. • Correct the block number. • Correct the device specification. • Correct the command or specified device.
59H	An extension file register cannot be specified.	Correct the device specification.
60H	The communication time between the CPU module and the Ethernet-equipped module exceeded the response monitoring timer value.	Increase the response monitoring timer value.

End code	Error details and causes	Action
63H	In communications using a fixed buffer, the remote password of the port for the destination Ethernet module is in the lock status.	• After unlocking the remote password using the SLMP, perform communications using a fixed buffer. • Exclude ports used for communications using a fixed buffer from the targets of the remote password check.

APPENDICES

Appendix 1 Module Label

The I/O signals and buffer memory of the Ethernet-equipped module can be set using module label.

Structure of the module label

The module label name is defined with the following structure.

"Instance name"_"Module number"."Port number"."Label name"

"Instance name"_"Module number"."Label name"

"Instance name"_"Module number"."Port number"."Label name"_D

"Instance name"_"Module number"."Label name"_D

Ex.

EN71_EE_1.stPort1.wnVal_IP_Address_D[0]

■Instance name

The following are the instance names of the RJ71EN71 corresponding to each network type setting.

Model	Instance name
RJ71EN71 (E+E)	EN71_EE
RJ71EN71 (CCIEC)	EN71_C
RJ71EN71 (E+CCIEC)	EN71_EC
RJ71EN71 (CCIEF)	EN71_F
RJ71EN71 (E+CCIEF)	EN71_EF

■Module number

A sequential number starting with "1" for identifying a module from the one with the same instance name.

■Port number

The port number is added to the module labels corresponding the buffer memory areas other than P1/P2 common area.

The following lists the characters corresponding to the port numbers

Port number	Added characters
P1	stPort1
P2	stPort2

■Label name

A label name unique to the module.

■_D

This symbol indicates that the module label is for direct access. The label without "_D" is for refresh. The following are the differences between refresh and direct access.

Type	Description	Access timing
Refresh	The values read/written from/to the module labels are reflected to the module at refresh. The execution time of the program can be shortened.	At refresh
Direct access	The values read/written from/to the module labels are reflected to the module immediately. Although the execution time of the program is longer than the one at refresh, the responsiveness is improved.	At writing to or reading from the module label

Appendix 2 I/O Signals

This section describes the I/O signals of the RJ71EN71 for the CPU module. The I/O signal assignment shows the case when then start I/O number of RJ71EN71 is 0.

List of I/O signals

The following table lists I/O signals. The device X is an input signal from the RJ71EN71 to the CPU module. The device Y is an input signal from the CPU module to the RJ71EN71.
The I/O signals differ when the network type is Ethernet, and Q-compatible Ethernet.

When network type is "Ethernet"

■Input signals

Device number	Signal name
X0*1	Module failure (On: Module failure, Off: Module normal)
X1 to XE	Use prohibited
XF	Module ready (On: Module operation possible, Off: Module operation not possible)
X10 to X1F	Use prohibited

*1 This signal enabled when the network type for the P2 connector is set to "CC-Link IE Field". For details on operation of the signal, refer to the following.
MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

■Output signals

Device number	Signal name
Y0 to Y1F	Use prohibited

Point

- Do not use (turn on) any "use prohibited" signals as an input or output signal to the CPU module. Doing so may cause malfunction of the programmable controller system.
- For the I/O signals of the P2 connector when its network type is set to "CC-Link IE Control", refer to the following.

MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)

- For the I/O signals of the P2 connector when its network type is set to "CC-Link IE Field", refer to the following.

MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

When the network type is "Q compatible Ethernet"

With the Q-compatible Ethernet, the same I/O signals as the MELSEC-Q series Ethernet interface module can be used except in some cases.

The following table lists the differences of the RJ71EN71 and MELSEC-Q series Ethernet interface modules.

Device number	RJ71EN71	QJ71E71-100
X1C	ERR LED lit confirmation*1 (On: Lit, Off: —)	COM.ERR. LED lit confirmation (On: Lit, Off: —)
Y17	ERR LED off request*2 (On: At off request, Off: -)	COM.ERR. LED off request (On: At off request, Off: -)
Y19	Use prohibited	Initial request signal (On: At request, Off: —)

*1 This signal turns on when the ERR LED or the P ERR LED of P1 is on or flashing.

*2 The details are listed below.

· The ERR LED and the P ERR LED of P1 turn off.

· An off request continues to be issued while this signal is on. (Does not light while on.)

· The event is registered in event history when off process is executed.

· This signal cannot be turned off during major error.

· If the error occurs again after turning on and off, the ERR LED or P ERR LED will turn on or flash according to the details of the error.

· Currently occurring error and error history information is not cleared.

For details on the other I/O signals, refer to the following.

Q Corresponding Ethernet Interface Module User's Manual (Basic)

Point

Do not use (turn on) any "use prohibited" signals as an input or output signal to the CPU module. Doing so may cause malfunction of the programmable controller system.

Appendix 3 Buffer Memory

The buffer memory is used for the following applications.

Module	Application
RJ71EN71	Exchanges data with the CPU module.
CPU module	Stores data such as the setting values for the Ethernet function and monitor values, and data used for exchanging data with the multiple CPU function.

Buffer memory values are defaulted when the CPU module is reset or the system is powered off.

List of buffer memory addresses

RJ71EN71

The following table lists the buffer memory addresses when the network type of the RJ71EN71 is set to "Ethernet".

When setting "Q Compatible Ethernet", refer to the following.

(☞ Page 200 When using the RJ71EN71 (network type: Q-compatible Ethernet))

P1 address (P2 address)		Application	Name
Decimal	Hexadecimal		
0 to 3 (2000000 to 2000003)	0H to 3H (1E8480H to 1E8483H)	System area	
4 to 5 (2000004 to 2000005)	4H to 5H (1E8484H to 1E8485H)	Own node setting status storage area	Own node IP address
6 to 13 (2000006 to 2000013)	6H to DH (1E8486H to 1E848DH)		System area
14 to 15 (2000014 to 2000015)	EH to FH (1E848EH to 1E848FH)		Subnet mask
16 to 17 (2000016 to 2000017)	10H to 11H (1E8490H to 1E8491H)		System area
18 to 19 (2000018 to 2000019)	12H to 13H (1E8492H to 1E8493H)		Default gateway IP address
20 to 27 (2000020 to 2000027)	14H to 1BH (1E8494H to 1E849BH)		System area
28 to 30 (2000028 to 2000030)	1CH to 1EH (1E849CH to 1E849EH)		Own node MAC address
31 (2000031)	1FH (1E849FH)		Own node network number
32 (2000032)	20H (1E84A0H)		Station number
33 (2000033)	21H (1E84A1H)		Transient transmission group number
34 (2000034)	22H (1E84A2H)		Send frame setting
35 (2000035)	23H (1E84A3H)		Jumbo frame setting
36 (2000036)	24H (1E84A4H)		Communication speed setting
37 (2000037)	25H (1E84A5H)		Auto-open UDP port number
38 (2000038)	26H (1E84A6H)		MELSOFT connection TCP port number

P1 address (P2 address)		Application	Name	
Decimal	Hexadecimal			
39 (2000039)	27H (1E84A7H)	Own node setting status storage area	MELSOFT connection UDP port number	
40 (2000040)	28H (1E84A8H)		MELSOFT direct connection port number	
41 to 99 (2000041 to 2000099)	29H to 63H (1E84A9H to 1E84E3H)	System area		
100 to 163 (2000100 to 2000163)	64H to A3H (1E84E4H to 1E8523H)	Connection status storage area	Connection No.1 latest error code to Connection No.64 latest error code	
164 to 999 (2000164 to 2000999)	A4H to 3E7H (1E8524H to 1E8867H)	System area		
1000 (2001000)	3E8H (1E8868H)	System port latest error code storage area	FTP server latest error code	
1001 (2001001)	3E9H (1E8869H)		MELSOFT direct connection latest error code	
1002 to 4999 (2001002 to 2004999)	3EAH to 1387H (1E886AH to 1E9807H)	System area		
5000 to 5001 (2005000 to 2005001)	1388H to 1389H (1E9808H to 1E9809H)	Status for each protocol	IP packet	Received packet total count
5002 to 5003 (2005002 to 2005003)	138AH to 138BH (1E980AH to 1E980BH)			Received packet checksum error discard count
5004 to 5005 (2005004 to 2005005)	138CH to 138DH (1E980CH to 1E980DH)			Sent packet total count
5006 to 5021 (2005006 to 2005021)	138EH to 139DH (1E980EH to 1E981DH)			System area
5022 to 5023 (2005022 to 2005023)	139EH to 139FH (1E981EH to 1E981FH)			Simultaneous transmission error detection count (receive buffer full count)
5024 to 5039 (2005024 to 2005039)	13A0H to 13AFH (1E9820H to 1E982FH)		System area	
5040 to 5041 (2005040 to 2005041)	13B0H to 13B1H (1E9830H to 1E9831H)		ICMP packet	Received packet total count
5042 to 5043 (2005042 to 2005043)	13B2H to 13B3H (1E9832H to 1E9833H)			Received packet checksum error discard count
5044 to 5045 (2005044 to 2005045)	13B4H to 13B5H (1E9834H to 1E9835H)			Sent packet total count
5046 to 5047 (2005046 to 2005047)	13B6H to 13B7H (1E9836H to 1E9837H)			Received echo request total count
5048 to 5049 (2005048 to 2005049)	13B8H to 13B9H (1E9838H to 1E9839H)			Sent echo replay total count
5050 to 5051 (2005050 to 2005051)	13BAH to 13BBH (1E983AH to 1E983BH)			Sent echo request total count
5052 to 5053 (2005052 to 2005053)	13BCH to 13BDH (1E983CH to 1E983DH)			Received echo reply total count

P1 address (P2 address)		Application	Name	
Decimal	Hexadecimal			
5054 to 5079 (2005054 to 2005079)	13BEH to 13D7H (1E983EH to 1E9857H)	Status for each protocol	System area	
5080 to 5081 (2005080 to 2005081)	13D8H to 13D9H (1E9858H to 1E9859H)		TCP packet	Received packet total count
5082 to 5083 (2005082 to 2005083)	13DAH to 13DBH (1E985AH to 1E985BH)			Received packet checksum error discard count
5084 to 5085 (2005084 to 2005085)	13DCH to 13DDH (1E985CH to 1E985DH)			Sent packet total count
5086 to 5119 (2005086 to 2005119)	13DEH to 13FFH (1E985EH to 1E987FH)		System area	
5120 to 5121 (2005120 to 2005121)	1400H to 1401H (1E9880H to 1E9881H)		UDP packet	Received packet total count
5122 to 5123 (2005122 to 2005123)	1402H to 1403H (1E9882H to 1E9883H)			Received packet checksum error discard count
5124 to 5125 (2005124 to 2005125)	1404H to 1405H (1E9884H to 1E9885H)			Sent packet total count
5126 to 5159 (2005126 to 2005159)	1406H to 1427H (1E9886H to 1E98A7H)		System area	
5160 to 5161 (2005160 to 2005161)	1428H to 1429H (1E98A8H to 1E98A9H)		Receiving error	Framing error count
5162 to 5163 (2005162 to 2005163)	142AH to 142BH (1E98AAH to 1E98ABH)			Receive FIFO overflow count
5164 to 5165 (2005164 to 2005165)	142CH to 142DH (1E98ACH to 1E98ADH)			CRC error count
5166 to 5188 (2005166 to 2005188)	142EH to 1444H (1E98AEH to 1E98C4H)		System area	
5189 (2005189)	1445H (1E98C5H)	Own node operation status storage area	LED status	
5190 (2005190)	1446H (1E98C6H)		System area	
5191 (2005191)	1447H (1E98C7H)		Hub connection status area	Communication mode
5192 (2005192)	1448H (1E98C8H)			Connection status
5193 (2005193)	1449H (1E98C9H)			Communication speed
5194 (2005194)	144AH (1E98CAH)			Disconnection count
5195 to 5199 (2005195 to 2005199)	144BH to 144FH (1E98CBH to 1E98CFH)		System area	
5200 (2005200)	1450H (1E98D0H)		IP address duplication status storage area	Same IP address detection flag
5201 to 5203 (2005201 to 2005203)	1451H to 1453H (1E98D1H to 1E98D3H)			MAC address of the station already connected to the network
5204 to 5206 (2005204 to 2005206)	1454H to 1456H (1E98D4H to 1E98D6H)			MAC address of the station with the IP address already used

P1 address (P2 address)		Application	Name	
Decimal	Hexadecimal			
5207 to 5300 (2005207 to 2005300)	1457H to 14B4H (1E98D7H to 1E9934H)	System area		
5301 (2005301)	14B5H (1E9935H)	Area for sending/ receiving instructions	RECV instruction execution request	
5302 to 5322 (2005302 to 2005322)	14B6H to 14CAH (1E9936H to 1E994AH)		System area	
5323 (2005323)	14CBH (1E994BH)		Link dedicated instruction	ZNRD instruction execution result
5324 (2005324)	14CCH (1E994CH)			System area
5325 (2005325)	14CDH (1E994DH)			ZNWR instruction execution result
5326 to 5625 (2005326 to 2005625)	14CEH to 15F9H (1E994EH to 1E9A79H)	System area		
5626 (2005626)	15FAH (1E9A7AH)	Remote password lock status storage area	Remote password lock status (connection No.1 to 16)	
5627 (2005627)	15FBH (1E9A7BH)		Remote password lock status (connection No.17 to 32)	
5628 (2005628)	15FCH (1E9A7CH)		Remote password lock status (connection No.33 to 48)	
5629 (2005629)	15FDH (1E9A7DH)		Remote password lock status (connection No.49 to 64)	
5630 (2005630)	15FEH (1E9A7EH)		Remote password lock status system port	
5631 to 5645 (2005631 to 2005645)	15FFH to 160DH (1E9A7FH to 1E9A8DH)	System area		
5646 (2005646)	160EH (1E9A8EH)	Forced connection invalidation setting area	Forced connection invalidation (connection No.1 to 16)	
5647 (2005647)	160FH (1E9A8FH)		Forced connection invalidation (connection No.17 to 32)	
5648 (2005648)	1610H (1E9A90H)		Forced connection invalidation (connection No.33 to 48)	
5649 (2005649)	1611H (1E9A91H)		Forced connection invalidation (connection No.49 to 64)	
5650 (2005650)	1612H (1E9A92H)		Forced connection invalidation system port	
5651 to 8299 (2005651 to 2008299)	1613H to 206BH (1E9A93H to 1EA4EBH)	System area		
8300 (2008300)	206CH (1EA4ECH)	Predefined protocol support function execution status check area	Connection No.1	Protocol execution status
8301 (2008301)	206DH (1EA4EDH)			System area
8302 to 8317 (2008302 to 2008317)	206EH to 207DH (1EA4EEH to 1EA4FDH)			Received data verification result (receive packet No.1 to 16)
8318 (2008318)	207EH (1EA4FEH)			Protocol execution count
8319 (2008319)	207FH (1EA4FFH)			Protocol cancellation specification
8320 to 8335 (2008320 to 2008335)	2080H to 208FH (1EA500H to 1EA50FH)			System area
8336 to 8875 (2008336 to 2008875)	2090H to 22ABH (1EA510H to 1EA72BH)		Connection No.2 to Connection No.64	

P1 address (P2 address)		Application	Name	
Decimal	Hexadecimal			
8876 to 10999 (2008876 to 2010999)	22ACH to 2AF7H (1EA72CH to 1EAF77H)	System area		
11000 (2011000)	2AF8H (1EAF78H)	Time setting function (SNTP) area	Time setting function operation result	
11001 (2011001)	2AF9H (1EAF79H)		Time setting function execution time	(Year)
11002 (2011002)	2AFAH (1EAF7AH)			(Month)
11003 (2011003)	2AFBH (1EAF7BH)			(Day)
11004 (2011004)	2AFCH (1EAF7CH)			(Hour)
11005 (2011005)	2AFDH (1EAF7DH)			(Minute)
11006 (2011006)	2AFEH (1EAF7EH)			(Second)
11007 (2011007)	2AFFH (1EAF7FH)			(Day of the week)
11008 (2011008)	2B00H (1EAF80H)		Time setting function required response time	
11009 (2011009)	2B01H (1EAF81H)		Time setting function (SNTP client) execution	
11010 to 11049 (2011010 to 2011049)	2B02H to 2B29H (1EAF82H to 1EAFA9H)	System area		
11050 to 11051 (2011050 to 2011051)	2B2AH to 2B2BH (1EAFAAH to 1EAFABH)	IP packet transfer function area	IP packet transfer latest data volume	
11052 to 11053 (2011052 to 2011053)	2B2CH to 2B2DH (1EAFACH to 1EAFADH)		IP packet transfer maximum data volume	
11054 to 11499 (2011054 to 2011499)	2B2EH to 2CEBH (1EAFAEH to 1EB16BH)	System area		
11500 to 11514 (2011500 to 2011514)	2CECH to 2CFAH (1EB16CH to 1EB17AH)	Dynamic routing function area	Communication path determination status	
11515 to 11599 (2011515 to 2011599)	2CFBH to 2D4FH (1EB17BH to 1EB1CFH)	System area		
11600 to 11663 (2011600 to 2011663)	2D50H to 2D8FH (1EB1D0H to 1EB20FH)	Remote password function monitoring area	Connection No.1 continuous unlock failure count to Connection No.64 continuous unlock failure count	
11664 (2011664)	2D90H (1EB210H)		Auto-open UDP port continuous unlock failure count	
11665 (2011665)	2D91H (1EB211H)		MELSOFT transmission port (UDP/IP) continuous unlock failure count	
11666 (2011666)	2D92H (1EB212H)		MELSOFT transmission port (TCP/IP) continuous unlock failure count	
11667 (2011667)	2D93H (1EB213H)		FTP transmission port (TCP/IP) continuous unlock failure count	
11668 (2011668)	2D94H (1EB214H)		MELSOFT direct connection continuous unlock failure count	
11669 to 19999 (2011669 to 2019999)	2D95H to 4E1FH (1EB215H to 1ED29FH)	System area		
20000 to 26143 (2020000 to 2026143)	4E20H to 661FH (1ED2A0H to 1EEA9FH)	Random access buffer area	Random access buffer	

P1 address (P2 address)		Application	Name	
Decimal	Hexadecimal			
26144 to 65534 (2026144 to 2065534)	6620H to FFFEH (1EEAA0H to 1F847EH)	System area		
65535 (2065535)	FFFFH (1F847FH)	Network type information area	Network type information	
65536	10000H	Area for communication using a fixed buffer	Fixed buffer No.1	Data length
65537 to 70655	10001H to 113FFH			Fixed buffer data
70656 to 147455	11400H to 23FFFH		Fixed buffer No.2 to Fixed buffer No.16	(The bit configuration is the same as Fixed buffer No.1)
147456 to 1899999 (2147456 to 3899999)	24000H to 1CFDDFH (20C480H to 3B825FH)	System area		

■P1/P2 common area

Address		Application	Name	
Decimal	Hexadecimal			
1900000 to 1900007	1CFDE0H to 1CFDE7H	Ethernet PORT1/2 common information	Open completion signal	
1900008 to 1900015	1CFDE8H to 1CFDEFH		Open request signal	
1900016 to 1900023	1CFDF0H to 1CFDF7H		Socket/fixed buffer reception status signal	
1900024	1CFDF8H		Initial status	
1900025	1CFDF9H		Initial error code	
1900026 to 1901001	1CFDFAH to 1D01C9H	System area		
1901002	1D01CAH	Predefined protocol support function check area	Predefined protocol ready	
1901003 to 1901019	1D01CBH to 1D01DBH	System area		
1901020	1D01DCH	Predefined protocol setting data check area	Predefined protocol setting data error information	Protocol number
1901021	1D01DDH			Setting type
1901022	1D01DEH			Packet number
1901023	1D01DFH			Element number
1901024	1D01E0H		Number of registered predefined protocols	
1901025 to 1901031	1D01E1H to 1D01E7H		System area	
1901032 to 1901047	1D01E8H to 1D01F7H		Predefined protocol registration	
1901048 to 1901999	1D01F8H to 1D05AFH	System area		
1902000 to 1904047	1D05B0H to 1D0DAFH	Send/receive area for predefined protocol support function	Send/receive area for predefined protocol support function	
1904048 to 1999999	1D0DB0H to 1E847FH	System area		

Point

- Do not write any data to "System area". Doing so may cause malfunction of the programmable controller system.
- If the value in an area of one word in size becomes equal to or higher than 65536, the count stops at 65535 (FFFFH).

CPU module

The following table lists the buffer memory addresses related to the Ethernet function of the CPU module.

Address		Application	Name	
Decimal	Hexadecimal			
50 to 51	32H to 33H	Own node setting status storage area	Own node IP address	
60 to 61	3CH to 3DH		Subnet mask	
64 to 65	40H to 41H		Default gateway IP address	
74 to 76	4AH to 4CH		Own node MAC address	
77	4DH		Own node network number	
78	4EH		Station number	
79	4FH		Transient transmission group number	
80	50H		Send frame setting	
82	52H		Communication speed setting	
83	53H		Auto-open UDP port number	
84	54H		MELSOFT connection TCP port number	
85	55H		MELSOFT connection UDP port number	
86	56H		MELSOFT direct connection port number	
130 to 145	82H to 91H	Connection status storage area	Connection No.1 latest error code to Connection No.16 latest error code	
146	92H	System port latest error code storage area	FTP server latest error code	
147	93H		MELSOFT direct connection latest error code	
150 to 151	96H to 97H	Status for each protocol	IP packet	Received packet total count
152 to 153	98H to 99H			Received packet checksum error discard count
154 to 155	9AH to 9BH			Sent packet total count
172 to 173	ACH to ADH			Simultaneous transmission error detection count (Receive buffer full count)
182 to 183	B6H to B7H		ICMP packet	Received packet total count
184 to 185	B8H to B9H			Received packet checksum error discard count
186 to 187	BAH to BBH			Sent packet total count
188 to 189	BCH to BDH			Received echo request total count
190 to 191	BEH to BFH			Sent echo replay total count
192 to 193	C0H to C1H			Sent echo request total count
194 to 195	C2H to C3H			Received echo reply total count
196 to 197	C4H to C5H		TCP packet	Received packet total count
198 to 199	C6H to C7H			Received packet checksum error discard count
200 to 201	C8H to C9H			Sent packet total count
204 to 205	CCH to CDH		UDP packet	Received packet total count
206 to 207	CEH to CFH			Received packet checksum error discard count
208 to 209	D0H to D1H			Sent packet total count
224 to 225	E0H to E1H		Receiving error	Framing error count
226 to 227	E2H to E3H			Receive FIFO overflow count
228 to 229	E4H to E5H			CRC error count

Address		Application	Name	
Decimal	Hexadecimal			
242	F2H	Own node operation status storage area	Hub connection status area	Communication mode
243	F3H			Connection status
244	F4H			Communication speed
245	F5H			Disconnection count
251	FBH		IP address duplication status storage area	Same IP address detection flag
252 to 254	FCH to FEH			MAC address of the station already connected to the network
255 to 257	FFH to 101H			MAC address of the station with the IP address already used
270	10EH	Remote password lock status storage area	Remote password lock status (connection No.1 to 16)	
271	10FH		Remote password lock status system port	
280	118H	Forced connection invalidation setting area	Forced connection invalidation (connection No.1 to 16)	
281	119H		Forced connection invalidation system port	
290	122H	Time setting function (SNTP) area	Time setting function operation result	
291	123H		Time setting function execution time	(Year)
292	124H			(Month)
293	125H			(Day)
294	126H			(Hour)
295	127H			(Minute)
296	128H			(Second)
297	129H			(Day of the week)
298	12AH		Time setting function required response time	
299	12BH		Time setting function (SNTP client) execution	
310 to 311	136H to 137H	IP packet transfer function area	IP packet transfer latest data volume	
312 to 313	138H to 139H		IP packet transfer maximum data volume	
320 to 335	140H to 14FH	Remote password function monitoring area	Connection No.1 continuous unlock failure count to Connection No.16 continuous unlock failure count	
336	150H		Auto-open UDP port continuous unlock failure count	
337	151H		MELSOFT transmission port (UDP/IP) continuous unlock failure count	
338	152H		MELSOFT transmission port (TCP/IP) continuous unlock failure count	
339	153H		FTP transmission port (TCP/IP) continuous unlock failure count	
340	154H		MELSOFT direct connection continuous unlock failure count	
350	15EH	Predefined protocol support function execution status check area	Connection No.1	Protocol execution status
351	15FH			System area
352 to 367	160H to 16FH			Received data verification result (receive packet No.1 to 16)
368	170H			Protocol execution count
369	171H			Protocol cancellation specification
370 to 669	172H to 29DH		Connection No.2 to Connection No.16	
680	2A8H	Open completion signal	Open completion signal	
681	2A9H	Open request signal	Open request signal	
682	2AAH	Socket communications reception status signal	Socket communications reception status signal	
683	2ABH	Initial status	Initial status	
684	2ACH	Initial error code	Initial error code	
692	2B4H	Predefined protocol support function check area	Predefined protocol ready	

Address		Application	Name	
Decimal	Hexadecimal			
710	2C6H	Predefined protocol setting data check area	Predefined protocol setting data error information	Protocol number
711	2C7H			Setting type
712	2C8H			Packet number
713	2C9H			Element number
714	2CAH		Number of registered predefined protocols	
722 to 737	2D2H to 2E1H		Predefined protocol registration	

Point

- Do not write any data to "System area". Doing so may cause malfunction of the programmable controller system.
- If the value in an area of one word in size becomes equal to or higher than 65536, the count stops at 65535 (FFFFH).

When using the RJ71EN71 (network type: Q-compatible Ethernet)

With the Q-compatible Ethernet, the same buffer memory addresses as the MELSEC-Q series Ethernet interface module can be used, excluding some addresses.

■Buffer memory addresses usable only with RJ71EN71

The following table lists the buffer memory addresses that can be used only with RJ71EN71.

Address		Application	Name
Decimal	Hexadecimal		
20700 to 20701	50DCH to 50DDH	Forced connection invalidation	Forced connection invalidation specification 20700 (b0 to 15): Connection No.1 to 16 20701 (b0): Auto-open UDP port 20701 (b1): MELSOFT application transmission port (UDP) 20701 (b2): MELSOFT application transmission port (TCP) 20701 (b3): FTP transmission port
65535	FFFFH	Network type information	Network type information

■Buffer memory addresses differing from MELSEC-Q series Ethernet interface modules

The following table lists the buffer memory addresses having specifications that differ from the ones of the MELSEC-Q series Ethernet interface module.

Address		Name			
Decimal	Hexadecimal	MELSEC-Q series Ethernet interface module		RJ71EN71	
0 to 1	0H to 1H	Own station E71 IP address Initial value: C00001FEH		Own station IP address Initial value: C0A80328H	
4	4H	Special function settings Initial value: 100H		Special function settings Initial value: 10H	
31	1FH	Communication condition setting (Ethernet Operation Setting) area Initial value: 0H Communication data code setting (b1) 0: Communications in a binary code 1: Communications in an ASCII code TCP existence confirmation setting (b4) 0: Use the Ping 1: Use the KeepAlive Send frame setting (b5) 0: Ethernet 1: IEEE 802.3 Setting of write enable/disable at RUN time (b6) 0: Disable 1: Enable Initial timing setting (b8) 0: Do not wait for OPEN (Communications impossible at STOP time) 1: Always wait for OPEN (Communication possible at STOP time) Reinitialization specification (b15) 0: Reinitialization process complete (reset by the system) 1: Reinitialization process request (set by the user)		Communication condition setting area Initial value: 100H Communication data code (b1) 0: Binary 1: ASCII Enable/disable online change (b6) 0: Disable all (SLMP) 1: Enable all (SLMP) Opening method (b8) 0: Open by program 1: Do not open by program Reinitialization specification (b15) 0: Reinitialization process complete (reset by the system) 1: Reinitialization process request (set by the user)	
40	28H	Communication address setting area Connection No.1	Own station port No. Initial value: 0H	Communication address setting area Connection No.1	Own station port No. Initial value: 0H
41 to 42	29H to 2AH		Destination IP address Initial value: 0H		Destination IP address Initial value: 0H
43	2BH		Destination Port No. Initial value: 0H		Destination Port No. Initial value: 0H
44 to 46	2CH to 2EH		Destination MAC address Initial value: FFFFFFFFFFFFH		System area
47 to 95	2FH to 5FH	Communication address setting area Connection No.2 to 8 (Same as connection No.1)		Communication address setting area Connection No.2 to 8 (Same as connection No.1)	
106 to 107	6AH to 6BH	Own station IP address Initial value: 0H		Own station IP address Initial value: C0A80328H	
108 to 110	6CH to 6EH	Own station MAC address Initial value: 0H		Own station MAC address Initial value: MAC address of the RJ71EN71	

Address		Name	
Decimal	Hexadecimal	MELSEC-Q series Ethernet interface module	RJ71EN71
116	74H	Auto-open UDP port number Initial value: 0H	Auto-open UDP port number Initial value: 1388H
200	C8H	LED status INIT. LED (b0) 0: Off 1: On (initial processing completed) OPEN LED (b1) 0: Off 1: On (connection open processing completed) ERR. LED (b3) 0: Off 1: On (setting error) COM.ERR. LED (b4) 0: Off 1: On (communication error)	LED status P ERR LED (b0) 0: Off 1: On or flashing
201	C9H	Hub connection status area Communication mode (b9) 0: Half-duplex 1: Full-duplex Hub connection status (b10) 0: Hub not connected/disconnected 1: Hub connected Data transmission speed (b15, b14) 00: Operating at 10BASE-T 01: Operating at 100BASE-TX	Hub connection status area Communication mode (b9) 0: Half-duplex 1: Full-duplex Hub connection status (b10) 0: Hub not connected/disconnected 1: Hub connected Data transmission speed (b15, b14) 00: Operating at 10BASE-T 01: Operating at 100BASE-TX 10: Operating at 1000BASE-T
202	CAH	Switch status (Operational mode setting) 0: Online 1: Offline 2: Self-loopback test 3: Hardware test	Module operation mode setting 0: Online mode 1: Offline mode 4: Module communication test mode
203	CBH	Status of settings with a programming tool Initial value: 0H Communication data code setting (b1) 0: Communications in a binary code 1: Communications in an ASCII code Initial/open method setting (b2) 0: No parameter setting (startup according to the sequence program) 1: Parameter setting (startup according to the parameters) TCP existence confirmation setting (b4) 0: Use the Ping 1: Use the KeepAlive Send frame setting (b5) 0: Ethernet 1: IEEE 802.3 Setting of write enable/disable at RUN time (b6) 0: Disable 1: Enable Initial timing setting (b8) 0: Do not wait for OPEN (Communications impossible at STOP time) 1: Always wait for OPEN (Communication possible at STOP time)	Status of settings with a programming tool Initial value: 100H Communication data code setting (b1) 0: Communications in a binary code 1: Communications in an ASCII code Send frame setting (b5) 0: Ethernet (fixed) Setting of write enable/disable at RUN time (b6) 0: Disable 1: Enable Opening method (b8) 0: Open by program 1: Do not open by program
398 to 399	18EH to 18FH	Simultaneous transmission error detection count	Receive buffer full count
20486	5006H	Remote password status Initial value: 0H	Remote password lock/unlocked status (user connection) Initial value: Depending on the remote password setting
20487	5007H	Remote password status Initial value: 0H	Remote password lock/unlocked status (system connection) Initial value: Depending on the remote password setting
20595	5073H	Connection No.1 Accumulated count of unlock process abnormal end	Connection No.1 Remote password mismatch count
20600	5078H	Connection No.2 Accumulated count of unlock process abnormal end	Connection No.2 Remote password mismatch count
20605	507DH	Connection No.3 Accumulated count of unlock process abnormal end	Connection No.3 Remote password mismatch count

Address		Name	
Decimal	Hexadecimal	MELSEC-Q series Ethernet interface module	RJ71EN71
20610	5082H	Connection No.4 Accumulated count of unlock process abnormal end	Connection No.4 Remote password mismatch count
20615	5087H	Connection No.5 Accumulated count of unlock process abnormal end	Connection No.5 Remote password mismatch count
20620	508CH	Connection No.6 Accumulated count of unlock process abnormal end	Connection No.6 Remote password mismatch count
20625	5091H	Connection No.7 Accumulated count of unlock process abnormal end	Connection No.7 Remote password mismatch count
20630	5096H	Connection No.8 Accumulated count of unlock process abnormal end	Connection No.8 Remote password mismatch count
20635	509BH	Connection No.9 Accumulated count of unlock process abnormal end	Connection No.9 Remote password mismatch count
20640	50A0H	Connection No.10 Accumulated count of unlock process abnormal end	Connection No.10 Remote password mismatch count
20645	50A5H	Connection No.11 Accumulated count of unlock process abnormal end	Connection No.11 Remote password mismatch count
20650	50AAH	Connection No.12 Accumulated count of unlock process abnormal end	Connection No.12 Remote password mismatch count
20655	50AFH	Connection No.13 Accumulated count of unlock process abnormal end	Connection No.13 Remote password mismatch count
20660	50B4H	Connection No.14 Accumulated count of unlock process abnormal end	Connection No.14 Remote password mismatch count
20665	50B9H	Connection No.15 Accumulated count of unlock process abnormal end	Connection No.15 Remote password mismatch count
20670	50BEH	Connection No.16 Accumulated count of unlock process abnormal end	Connection No.16 Remote password mismatch count
20675	50C3H	Auto-open UDP port Accumulated count of unlock process abnormal end	Auto-open UDP port Remote password mismatch count
20680	50C8H	MELSOFT application transmission port (UDP) Accumulated count of unlock process abnormal end	MELSOFT application transmission port (UDP) Remote password mismatch count
20685	50CDH	MELSOFT application transmission port (TCP) Accumulated count of unlock process abnormal end	MELSOFT application transmission port (TCP) Remote password mismatch count
20690	50D2H	FTP transmission port Accumulated count of unlock process abnormal end	FTP transmission port Remote password mismatch count

■Buffer memory addresses not supported by the RJ71EN71

The following table lists the buffer memory addresses of the MELSEC-Q series Ethernet interface modules that are not supported by the RJ71EN71.

Address		Application	Name		
Decimal	Hexadecimal				
228	E4H	Error log area	Error log write pointer		
229 to 372	E5H to 174H		Error log block area		
944 to 949	3B0H to 3B5H	FTP setting area	FTP login name		
950 to 953	3B6H to 3B9H		Password		
20488	5008H	System port information area	System port use prohibited designation area	System port use prohibited designation	
20592	5070H	Monitoring area	Remote password function monitoring area	Remote password mismatch notification accumulated count designation (user connection)	
20593	5071H			Remote password mismatch notification accumulated count designation (system connection)	
20594	5072H			Connection No.1	Accumulated count of unlock process normal completion
20596	5074H				Accumulated count of lock process normal completion
20597	5075H				Accumulated count of lock process abnormal end
20598	5076H				Accumulated count of lock process based on close
20599	5077H			Connection No.2	Accumulated count of unlock process normal completion
20601	5079H				Accumulated count of lock process normal completion
20602	507AH				Accumulated count of lock process abnormal end
20603	507BH				Accumulated count of lock process based on close
20604	507CH			Connection No.3	Accumulated count of unlock process normal completion
20606	507EH				Accumulated count of lock process normal completion
20607	507FH				Accumulated count of lock process abnormal end
20608	5080H				Accumulated count of lock process based on close
20609	5081H			Connection No.4	Accumulated count of unlock process normal completion
20611	5083H				Accumulated count of lock process normal completion
20612	5084H				Accumulated count of lock process abnormal end
20613	5085H				Accumulated count of lock process based on close
20614	5086H			Connection No.5	Accumulated count of unlock process normal completion
20616	5088H				Accumulated count of lock process normal completion
20617	5089H				Accumulated count of lock process abnormal end
20618	508AH				Accumulated count of lock process based on close

Address		Application	Name		
Decimal	Hexadecimal				
20619	508BH	Monitoring area	Remote password function monitoring area	Connection No.6	Accumulated count of unlock process normal completion
20621	508DH				Accumulated count of lock process normal completion
20622	508EH				Accumulated count of lock process abnormal end
20623	508FH				Accumulated count of lock process based on close
20624	5090H			Connection No.7	Accumulated count of unlock process normal completion
20626	5092H				Accumulated count of lock process normal completion
20627	5093H				Accumulated count of lock process abnormal end
20628	5094H				Accumulated count of lock process based on close
20629	5095H			Connection No.8	Accumulated count of unlock process normal completion
20631	5097H				Accumulated count of lock process normal completion
20632	5098H				Accumulated count of lock process abnormal end
20633	5099H				Accumulated count of lock process based on close
20634	509AH			Connection No.9	Accumulated count of unlock process normal completion
20636	509CH				Accumulated count of lock process normal completion
20637	509DH				Accumulated count of lock process abnormal end
20638	509EH				Accumulated count of lock process based on close
20639	509FH			Connection No.10	Accumulated count of unlock process normal completion
20641	50A1H				Accumulated count of lock process normal completion
20642	50A2H				Accumulated count of lock process abnormal end
20643	50A3H				Accumulated count of lock process based on close
20644	50A4H			Connection No.11	Accumulated count of unlock process normal completion
20646	50A6H				Accumulated count of lock process normal completion
20647	50A7H				Accumulated count of lock process abnormal end
20648	50A8H				Accumulated count of lock process based on close

Address		Application	Name		
Decimal	Hexadecimal				
20649	50A9H	Monitoring area	Remote password function monitoring area	Connection No.12	Accumulated count of unlock process normal completion
20651	50ABH				Accumulated count of lock process normal completion
20652	50ACH				Accumulated count of lock process abnormal end
20653	50ADH				Accumulated count of lock process based on close
20654	50AEH			Connection No.13	Accumulated count of unlock process normal completion
20656	50B0H				Accumulated count of lock process normal completion
20657	50B1H				Accumulated count of lock process abnormal end
20658	50B2H				Accumulated count of lock process based on close
20659	50B3H			Connection No.14	Accumulated count of unlock process normal completion
20661	50B5H				Accumulated count of lock process normal completion
20662	50B6H				Accumulated count of lock process abnormal end
20663	50B7H				Accumulated count of lock process based on close
20664	50B8H			Connection No.15	Accumulated count of unlock process normal completion
20666	50BAH				Accumulated count of lock process normal completion
20667	50BBH				Accumulated count of lock process abnormal end
20668	50BCH				Accumulated count of lock process based on close
20669	50BDH			Connection No.16	Accumulated count of unlock process normal completion
20671	50BFH				Accumulated count of lock process normal completion
20672	50C0H				Accumulated count of lock process abnormal end
20673	50C1H				Accumulated count of lock process based on close
20674	50C2H			Auto-open UDP port	Accumulated count of unlock process normal completion
20676	50C4H				Accumulated count of lock process normal completion
20677	50C5H				Accumulated count of lock process abnormal end
20678	50C6H				Accumulated count of lock process based on close

Address		Application	Name		
Decimal	Hexadecimal				
20679	50C7H	Monitoring area	Remote password function monitoring area	MELSOFT application transmission port (UDP)	Accumulated count of unlock process normal completion
20681	50C9H				Accumulated count of lock process normal completion
20682	50CAH				Accumulated count of lock process abnormal end
20683	50CBH				Accumulated count of lock process based on close
20684	50CCH			MELSOFT application transmission port (TCP)	Accumulated count of unlock process normal completion
20686	50CEH				Accumulated count of lock process normal completion
20687	50CFH				Accumulated count of lock process abnormal end
20688	50D0H				Accumulated count of lock process based on close
20689	50D1H			FTP transmission port	Accumulated count of unlock process normal completion
20691	50D3H				Accumulated count of lock process normal completion
20692	50D4H				Accumulated count of lock process abnormal end
20693	50D5H				Accumulated count of lock process based on close
20737 to 20855	5101H to 5177H	HTTP status storage area			
20992 to 20995	5200H to 5203H	"Issue system switching request at disconnection detection" status storage area			
21008 to 21009	5210H to 5211H	"System switching settings when communication error occurs" status storage area			
22640 to 24575	5870H to 5FFFH	E-mail status storage area			

For details on other buffer memory addresses that can be used in the RJ71EN71, refer to the following.

Q Corresponding Ethernet Interface Module User's Manual (Basic)

Details of buffer memory addresses

This section descries the buffer memory of the Ethernet-equipped module.

The following buffer memory addresses for when the P1 connecter of the RJ71EN71 is used.

Own node setting status storage area

■Own node IP address (Un\G4 to Un\G5)

The IP address set with the module parameter is stored.

Address	Description
Un\G4	First octet, second octet
Un\G5	Third octet, fourth octet

■Subnet mask (Un\G14 to Un\G15)

The subnet mask set with the module parameter is stored.

Address	Description
Un\G14	First octet, second octet
Un\G15	Third octet, fourth octet

■Default gateway IP address (Un\G18 to Un\G19)

The default gateway IP address set with the module parameter is stored.

Address	Description
Un\G18	First octet, second octet
Un\G19	Third octet, fourth octet

■Own node MAC address (Un\G28 to Un\G30)

The MAC address of the Ethernet-equipped module is stored.

Address	Description
Un\G28	5th byte, 6th byte of the MAC address
Un\G29	3rd byte, 4th byte of the MAC address
Un\G30	1st byte, 2nd byte of the MAC address

■Jumbo frame setting (Un\G35)

Address	Description
Un\G35	Stores the jumbo frame set with the module parameter. 0: Disable (MTU 1500 byte) 2: 2KB (MTU 2034 byte) 3: 3KB (MTU 3058 byte) 4: 4KB (MTU 4082 byte) 5: 5KB (MTU 5106 byte) 6: 6KB (MTU 6130 byte) 7: 7KB (MTU 7154 byte) 8: 8KB (MTU 8178 byte) 9: 9KB (MTU 9004 byte)

■Communication speed setting (Un\G36)

Address	Description
Un\G36	Stores the communication speed set with the module parameter. 0: Automatic negotiation 1: 10Mbps/half-duplex 2: 10Mbps/full-duplex 3: 100Mbps/half-duplex 4: 100Mbps/full-duplex 6: 1Gbps/full-duplex

Connection status storage area

■Connection No.1 latest error code to connection No.64 latest error code (Un\G100 to Un\G163)

The latest error code for each connection is stored.

Address	Name
Un\G100	Connection No.1 latest error code
Un\G101	Connection No.2 latest error code
⋮	
Un\G162	Connection No.63 latest error code
Un\G163	Connection No.64 latest error code

Status for each protocol

■IP packet (Un\G5000 to Un\G5023)

The IP status is counted in the range of 0 to 4294967295 (FFFFFFFH).

Address	Name
Un\G5000 to Un\G5001	Received packet total count
Un\G5002 to Un\G5003	Received packet checksum error discard count
Un\G5004 to Un\G5005	Sent packet total count
Un\G5022 to Un\G5023	Simultaneous transmission error detection count (receive buffer full count)

■ICMP packet (Un\G5040 to Un\G5053)

The ICMP status is counted in the range of 0 to 4294967295 (FFFFFFFH).

Address	Name
Un\G5040 to Un\G5041	Received packet total count
Un\G5042 to Un\G5043	Received packet checksum error discard count
Un\G5044 to Un\G5045	Sent packet total count
Un\G5046 to Un\G5047	Received echo request total count
Un\G5048 to Un\G5049	Sent echo replay total count
Un\G5050 to Un\G5051	Sent echo request total count
Un\G5052 to Un\G5053	Received echo reply total count

■TCP packet (Un\G5080 to Un\G5085)

The TCP status is counted in the range of 0 to 4294967295 (FFFFFFFH).

Address	Name
Un\G5080 to Un\G5081	Received packet total count
Un\G5082 to Un\G5083	Received packet checksum error discard count
Un\G5084 to Un\G5085	Sent packet total count

■UDP packet (Un\G5120 to Un\G5125)

The UDP status is counted in the range of 0 to 4294967295 (FFFFFFFH).

Address	Name
Un\G5120 to Un\G5121	Received packet total count
Un\G5122 to Un\G5123	Received packet checksum error discard count
Un\G5124 to Un\G5125	Sent packet total count

■Receiving error (Un\G5160 to Un\G5165)

The receive error status is counted in the range of 0 to 4294967295 (FFFFFFFH).

Address	Description
Un\G5160 to Un\G5161	Framing error count
Un\G5162 to Un\G5163	Receive FIFO overflow count
Un\G5164 to Un\G5165	CRC error count

Own node operation status storage area

■LED status (Un\G5189)

Address	Description
Un\G5189	Stores the on/off status of the P ERR LED. 0: Off 1: On or flashing

■Hub connection status area (Un\G5191 to Un\G5194)

The hub connection status of the Ethernet-equipped module is stored.

Address	Name	Description
Un\G5191	Communication mode	Stores the communication mode. 0: Half-duplex 1: Full-duplex
Un\G5192	Connection status	Stores the connection status. 0: Hub is not connected or disconnected 1: Hub connected
Un\G5193	Communication speed	Stores the communication speed. 0: Operating at 10BASE-T 1: Operating at 100BASE-TX 2: Operating at 1000BASE-T
Un\G5194	Disconnection count	Stores the number of times the cable was disconnected.

■IP address duplication status storage area (Un\G5200 to Un\G5206)

Information when IP address is duplicated is stored.

Address	Name	Description
Un\G5200	Same IP address detection flag	Stores IP address duplication status. 0: IP address not duplicated 1: IP address duplicated
Un\G5201 to Un\G5203	MAC address of the station already connected to the network	Stores the MAC address of the station that has been already connected to the network in the station with duplicated IP address. Un\G5201: 5th byte, 6th byte of the MAC address Un\G5202: 3rd byte, 4th byte of the MAC address Un\G5203: 1st byte, 2nd byte of the MAC address "FFFFFFFFFFFFH" is stored in the station that has been already connected to the network.
Un\G5204 to Un\G5206	MAC address of the station with the IP address already used	Stores the MAC address of the station with duplicated IP address in the station that has been already connected to the network. Un\G5204: 5th byte, 6th byte of the MAC address Un\G5205: 3rd byte, 4th byte of the MAC address Un\G5206: 1st byte, 2nd byte of the MAC address "FFFFFFFFFFFFH" is stored in the station with duplicated IP address.

Area for sending/receiving instructions

■RECV instruction execution request (Un\G5301)

Address	Description
Un\G5301	Stores the RECV instruction execution request status of each channel in b0 to b7 (channel 1 to 8). On: Requesting Off: No request

■Link dedicated instruction (Un\G5323 to Un\G5325)

The execution result of the link dedicated instruction is stored.

Address	Name	Description
Un\G5323	ZNRD instruction execution result	Stores the execution result of the ZNRD instruction. 0: Completed successfully Other than 0: Completed with an error (Error code is stored.)
Un\G5325	ZNWR instruction execution result	Stores the execution result of the ZNWR instruction. 0: Completed successfully Other than 0: Completed with an error (Error code is stored.)

Remote password lock status storage area

The remote password lock status of each connection is stored.

- 0: Unlocked or remote password not set
- 1: Lock status

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G5626	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G5629	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

The numbers in the table indicate connection numbers.

■Remote password lock status system port (Un\G5630)

Address	Description
Un\G5630	Stores the remote password lock status of the system port in b0 to b4. 0: Unlocked or remote password not set 1: Lock status The bits corresponding to each system port are shown below. b0: Auto-open UDP port b1: MELSOFT application transmission port (UDP) b2: MELSOFT application transmission port (TCP) b3: FTP transmission port b4: MELSOFT direct connection

Forced connection invalidation setting area

Set the connection to be forcibly invalidated.

- 0: Use allowed
- 1: Use prohibited

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G5646	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G5649	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

The numbers in the table indicate connection numbers.

■Forced connection invalidation system port (Un\G5650)

Address	Description
Un\G5650	Set the system port to be forcibly invalidated. 0: Use allowed 1: Use prohibited The bits corresponding to each system port are shown below. b0: Auto-open UDP port b1: MELSOFT application transmission port (UDP) b2: MELSOFT application transmission port (TCP) b3: FTP transmission port b4: MELSOFT direct connection

Predefined protocol support function execution status check area

■Connection No.1 (Un\G8300 to Un\G8335)

The execution status of the predefined protocol support function is stored.

For addresses corresponding to connections after the connection No.2, refer to the following.

☞ Page 191 List of buffer memory addresses

Address	Name	Description
Un\G8300	Protocol execution status	Stores the status of the protocol being executed at connection No.1. 0: Unexecuted 1: Waiting for transmission 2: Sending 3: Waiting for data reception 4: Receiving 5: Execution completed
Un\G8301	System area	—
Un\G8302	Received data verification result (receive packet No.1)	Stores the verification results of receive packet No.1. • Element No. where the verification result did not match (b0 to b7) 0: Verification matched 1 to 32: Element No. where the verification result did not match FFH: Verification not performed • The cause of mismatch (verification result code) (b8 to b15)*1
Un\G8303 to Un\G8317	Received data verification result (receive packet No.2 to 16)	The configuration is the same as receive packet No. 1.
Un\G8318	Protocol execution count	Stores the number of protocol executions in Connection No.1. 0: Protocol not executed 1 to 65535: Number of executions (When the number exceeds 65535, the value remains 65535.)
Un\G8319	Protocol cancellation specification	Cancels the protocol executed in Connection No.1. 0: No cancellation instruction 1: Cancellation request (set by user) 2: Cancellation completed (set by system)
Un\G8320 to Un\G8335	System area	—

*1 The following table lists the verification result codes and causes of verification mismatch.

Stored value	Description	Cause
00H	Normal	—
01H	Insufficient receive data	The total packet size of receive data is smaller than that set in protocol data.
10H	Data not matched	The receive data do not match the value set in protocol data.
11H	ASCII-binary conversion error	When the code type setting is "ASCII Hexadecimal", data not in ASCII code are received.
12H	Data length error	The received length value exceeded 2046 bytes.
30H	Data length size error	The Length value received from the external device does not match the actual length.
FFH	Verification not performed	—

Time setting function (SNTP) area

■Time setting function operation result (Un\G11000)

Address	Description
Un\G11000	Stores the operation result of the time setting function. 0: Unexecuted 1: Success FFFFH: Failure

■Time setting function execution time (Un\G11001 to Un\G11007)

Address	Name	Description
Un\G11001	Year	Stores the year that the time setting function was executed.
Un\G11002	Month	Stores the month that the time setting function was executed.
Un\G11003	Day	Stores the date that the time setting function was executed.
Un\G11004	Hour	Stores the time (hour) that the time setting function was executed.
Un\G11005	Minute	Stores the time (minute) that the time setting function was executed.
Un\G11006	Second	Stores the time (second) that the time setting function was executed.
Un\G11007	Day of the week	Stores the day of the week that the time setting function was executed. 0: Sunday 1: Monday 2: Tuesday 3: Wednesday 4: Thursday 5: Friday 6: Saturday

■Time setting function required response time (Un\G11008)

Address	Description
Un\G11008	Stores the time required for the module to set the time after sending to the SNTP server. Range: 0 to FFFEH (Unit: ms)

■Time setting function (SNTP client) execution (Un\G11009)

Address	Description
Un\G11009	Executes the time setting function when b0 is turned on. The time setting function can be executed at a random time from a program. The function is not executed if b0 is turned on during execution of the time setting function. This is valid only when "Use" is set for "Time Setting (SNTP Client)" under "Time Setting" in "Application Settings".

IP packet transfer function area

■IP packet transfer latest data volume (Un\G11050 to Un\G11051)

Address	Description
Un\G11050 to Un\G11051	Stores the latest value (byte/s) of the total size (byte) per unit time (1 second) of the transferred IP address. (The low-order 16-bit value is stored in the 1st word, and the high-order 16-bit value is stored in the 2nd word.) Range: 0 to 4294967295 (FFFFFFFFH) The value is 4294967295 (FFFFFFFFH) if the above value is exceeded.

■IP packet transfer maximum data volume (Un\G11052 to Un\G11053)

Address	Description
Un\G11052 to Un\G11053	Stores the maximum value (byte/s) of the total size (byte) per unit time (1 second) of the transferred IP packet. (The low-order 16-bit value is stored in the 1st word, and the high-order 16-bit value is stored in the 2nd word.) Range: 0 to 4294967295 (FFFFFFFFH) The value is 4294967295 (FFFFFFFFH) if the above value is exceeded.

Dynamic routing function area

■Communication path determination status (Un\G11500 to Un\G11514)

The determination status of the communication path for each network number of the destination station is stored.

- 0: Path undetermined
- 1: Path determined

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	0
Un\G11500	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G11514	Empty	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225

The numbers in the table indicate network numbers.

Remote password function monitoring area

The number of times each connection and system port remote password unlocking failed continuously is counted in the range of 0 to 65535.

Address	Name
Un\G11600	Connection No.1 continuous unlock failure count
Un\G11601	Connection No.2 continuous unlock failure count
⋮	
Un\G11662	Connection No.63 continuous unlock failure count
Un\G11663	Connection No.64 continuous unlock failure count
Un\G11664	Auto-open UDP port continuous unlock failure count
Un\G11665	MELSOFT transmission port (UDP/IP) continuous unlock failure count
Un\G11666	MELSOFT transmission port (TCP/IP) continuous unlock failure count
Un\G11667	FTP transmission port (TCP/IP) continuous unlock failure count
Un\G11668	MELSOFT direct connection continuous unlock failure count

Random access buffer area

■Random access buffer (Un\G20000 to Un\G26143)

This area is used for reading or writing the data when exchanging data with the random access buffer.

Network type information area

■Network type information (Un\G65535)

Address	Description
Un\G65535	Stores the network type. 0: Ethernet 1: CC-Link IE Field Network 2: CC-Link IE Controller Network 3: Ethernet (Q series-compatible)

Area for communication using a fixed buffer

■Fixed buffer No.1 (Un\G65536 to Un\G70655)

This area is used for sending and receiving data during fixed buffer communication.

For addresses corresponding to connections after the connection No.2, refer to the following.

☞ Page 191 List of buffer memory addresses

Address	Name	Description
Un\G65536	Data length	Stores the data length of the fixed buffer data.
Un\G65537 to Un\G70655	Fixed buffer data	Stores the fixed buffer data.

Ethernet PORT1/2 common information

■Open completion signal (Un\G1900000 to Un\G1900007)

The open status of each connection is stored.

- 0: Closed or not open
- 1: Open completed

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G1900000	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G1900007	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113

The numbers in the table indicate connection numbers.

■Open request signal (Un\G1900008 to \G1900015)

The open processing status of each connection is stored.

- 0: No open request
- 1: Requesting open

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G1900008	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G1900015	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113

The numbers in the table indicate connection numbers.

■Socket/fixed buffer reception status signal (Un\G1900016 to Un\G1900023)

The reception status of each connection is stored.

- 0: Data not received
- 1: Data reception completed

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G1900016	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G1900023	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113

The numbers in the table indicate connection numbers.

■Initial status (Un\G1900024)

Address	Description
Un\G1900024	Stores the status of the RJ71EN71 (when using the Ethernet function) initial processing. Initial normal completion status (b0) 0: — 1: Initialization normal completion Initial abnormal completion status (b1) 0: — 1: Initialization abnormal completion b2 to b15: Use prohibited

■Initial error code (Un\G1900025)

Address	Description
Un\G1900025	Stores the information when the RJ71EN71 (when using Ethernet function) initial processing is completed abnormally. 0: In initial processing or initial normal completion Other than 0: Initial processing error code (Error code is stored.)

Predefined protocol support function check area

■Predefined protocol ready (Un\G1901002)

Address	Description
Un\G1901002	Stores the ready status of the protocol setting data. 0: — 1: Ready

Predefined protocol setting data check area

■Predefined protocol setting data error information (Un\G1901020 to Un\G1901023)

Address	Name	Description
Un\G1901020	Protocol number	When a protocol setting data error is detected, stores the protocol number where the error was detected. Protocol is checked in order from smallest protocol number. The protocol number where an error was detected first is stored. 0: No error 1 to 128: Protocol number 65535: Cannot identify*1
Un\G1901021	Setting type	0 is stored if an error is detected in the packet setting or element setting. 1 is stored if an error is detected in the protocol detailed setting. (Valid when protocol number value is 1 to 128) 0: Packet setting or element setting 1: Protocol preferences 65535: Cannot identify*1
Un\G1901022	Packet number	When an error is detected in the protocol setting data, stores the packet number that detected the error. The packets are checked in order of send packets and then receive packets (expected packets) from smallest number. The packet number where an error was detected first is stored. (Valid when setting type value is 0) 0: Send packet 1 to 16: Receive packet number 65535: Cannot identify*1
Un\G1901023	Element number	When an error is detected in the protocol setting data, stores the element number where the error was detected. The elements are checked in order of smallest element number. The element number where an error was detected first is stored. (Valid when setting type value is 0) 1 to 32: Element number 65535: Cannot identify*1

*1 The setting value may be unidentifiable (65535) in the following cases.
· When a setting that cannot be detected by the current Ethernet-equipped module version is written in
· When protocol setting data is broken (hardware failure)

■Number of registered predefined protocols (Un\G1901024)

Address	Description
Un\G1901024	Stores the protocol number of the registered protocol setting data. 0 is stored if the protocol setting data check result is abnormal. 0: No registration 1 to 128: Number of registrations

■Predefined protocol registration (Un\G1901032 to Un\G1901047)

Whether protocol setting data is registered or not is stored.

All bits are set to 0 if the protocol setting data check result is abnormal.

- 0: No registration
- 1: Registered

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G1901032	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⋮																
Un\G1901039	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113
Un\G1901040 to Un\G1901047	Empty															

The numbers in the table indicate protocol numbers.

Send/receive area for predefined protocol support function

■Send/receive area for predefined protocol support function (Un\G1902000 to Un\G1904047)

This area is used for sending and receiving data during communication with predefined protocol.

Appendix 4 Dedicated Instruction

This section describes the dedicated instruction that can be used in Ethernet.

Point

For details on dedicated instructions, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

Open/close instructions

The following table lists the dedicated instructions used for open or close processing.

○: Available, ×: Not available

Instruction	Description	Availability	
		RJ71EN71	CPU module
GP.CONOPEN	Establishes a connection.	○	×
SP.SOCOPEN		×	○
OPEN		○	×
GP.CONCLOSE	Closes the connection.	○	×
SP.SOCCLOSE		×	○
CLOSE		○	×

Instructions for predefined protocol communications

The following table lists the dedicated instructions used for communications using the predefined protocol.

○: Available, ×: Not available

Instruction	Description	Availability	
		RJ71EN71	CPU module
GP.ECPRTCL	Executes the protocol registered with the engineering tool's communication protocol support function.	○	×
SP.ECPRTCL		×	○

Socket communications instructions

The following table lists the dedicated instructions used for socket communications.

○: Available, ×: Not available

Instruction	Description	Availability	
		RJ71EN71	CPU module
GP.SOCRCV	Reads the receive data from the external device.	○	×
SP.SOCRCV		×	○
G.SOCRCVS		○	○
S.SOCRCVS		×	○
GP.SOCSND	Sends data to the external device.	○	○
SP.SOCSND		×	○
SP.SOCCINF	Reads connection information	×	○
SP.SOCCSET	Changes the communication target	×	○
SP.SOCRMODE	Changes the connection receive mode.	×	○
S(P).SOCRDATA	Reads the specified size of data from the socket communication receive data area.	×	○

Instructions for communications using a fixed buffer

The following table lists the dedicated instructions used in the RJ71EN71 for communications using a fixed buffer.

Instruction	Description
BUFRCV	Reads the receive data from the external device.
BUFRCVS	Reads the receive data with an interrupt program.
BUFSND	Sends data to the external device.

Link dedicated instructions

The following table lists the dedicated instructions used in the RJ71EN71 for transient transmission with programmable controllers on other stations. Each link dedicated instruction allows access to a station on a network other than Ethernet.

Instruction	Description
SEND	Sends data to another station.
RECV	Reads the receive data from another station. (for main program)
RECVS	Reads the receive data from another station. (for interrupt program)
READ	Reads data from the word device of another station.
SREAD	Reads data from the word device of another station. (with completion device)
WRITE	Writes data in the word device of another station.
SWRITE	Writes data in the word device of another station. (with completion device)
REQ	Requests the remote RUN/STOP to the CPU module on another station.
	Reads/writes clock data from/to another station.
ZNRD	Reads data from the word device in another station (ACPU).
ZNWR	Writes data in the word device in another station (ACPU).

Other dedicated instructions

The following table lists other instructions that can be used in the RJ71EN71.

Instruction	Description
ERRCLEAR*1	Turns off the LED and clears error information.
ERRRD	Reads error information.
UINI	Performs re-initial processing.

*1 Availability for turning off the LED depends on the firmware version of the RJ71EN71. (☞ Page 240 Added and Enhanced Functions)

Precautions for dedicated instructions

This section describes precautions when using dedicated instructions.

Precautions for dedicated instructions (common)

■When changing data specified by dedicated instructions

Do not change any data (such as control data) until execution of the dedicated instruction is completed.

■When the dedicated instruction is not completed

Check whether the mode of the RJ71EN71 is online.

A dedicated instruction cannot be executed when the mode is offline or module communication test.

Precautions for link dedicated instructions

The following describes precautions when executing multiple link dedicated instructions simultaneously.

■Channel of the link dedicated instructions

When executing multiple link dedicated instructions simultaneously, check that the channels for the instructions are not duplicated. Link dedicated instructions with the same channel cannot be executed simultaneously. To use the same channel for multiple link dedicated instructions, configure an interlock so that a instruction is executed after completion of another.

Appendix 5 TCP/IP Communications, UDP/IP Communications

This chapter describes the communication flow and procedure of TCP/IP communications and UDP/IP communications.

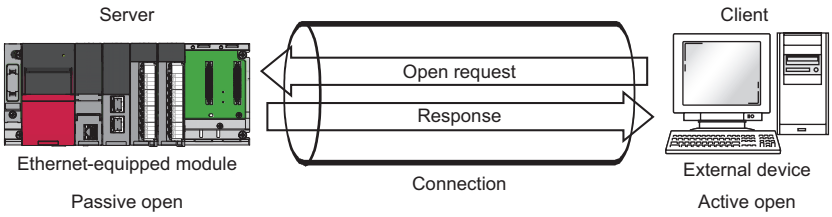
TCP/IP communications

This section describes TCP/IP communications.

Establishing a connection

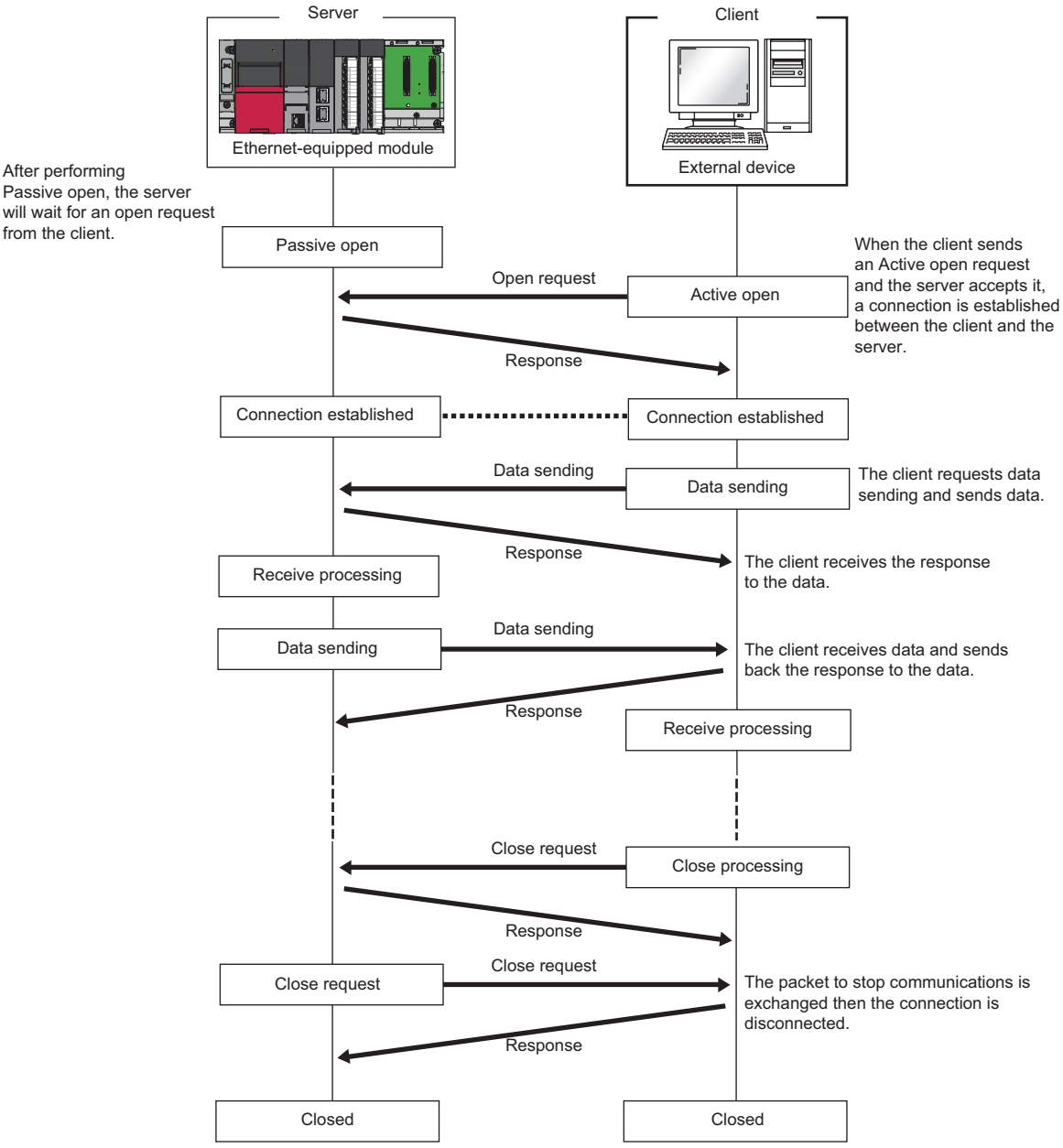
With TCP/IP communications, a connection must be established between the communicating devices. If the server side device has executed the Passive open processing and is in the standby state, the client side device makes an open request (Active open processing) to the server. When a response is returned, the connection is established.
With TCP/IP communications, a connection is established during communication. Since data is exchanged while checking that the data has correctly reached the communication destination, the data reliability can be ensured. Note that the line load is larger than UDP/IP communications.

Ex.
When the Ethernet-equipped module is Passive open



Communication flow

This section describes the flow from the establishment of connection to end of communication.



Point

Wait at least 500ms or more before executing the open processing again after the close request is sent from the external device to the Ethernet-equipped module.

Active open procedure

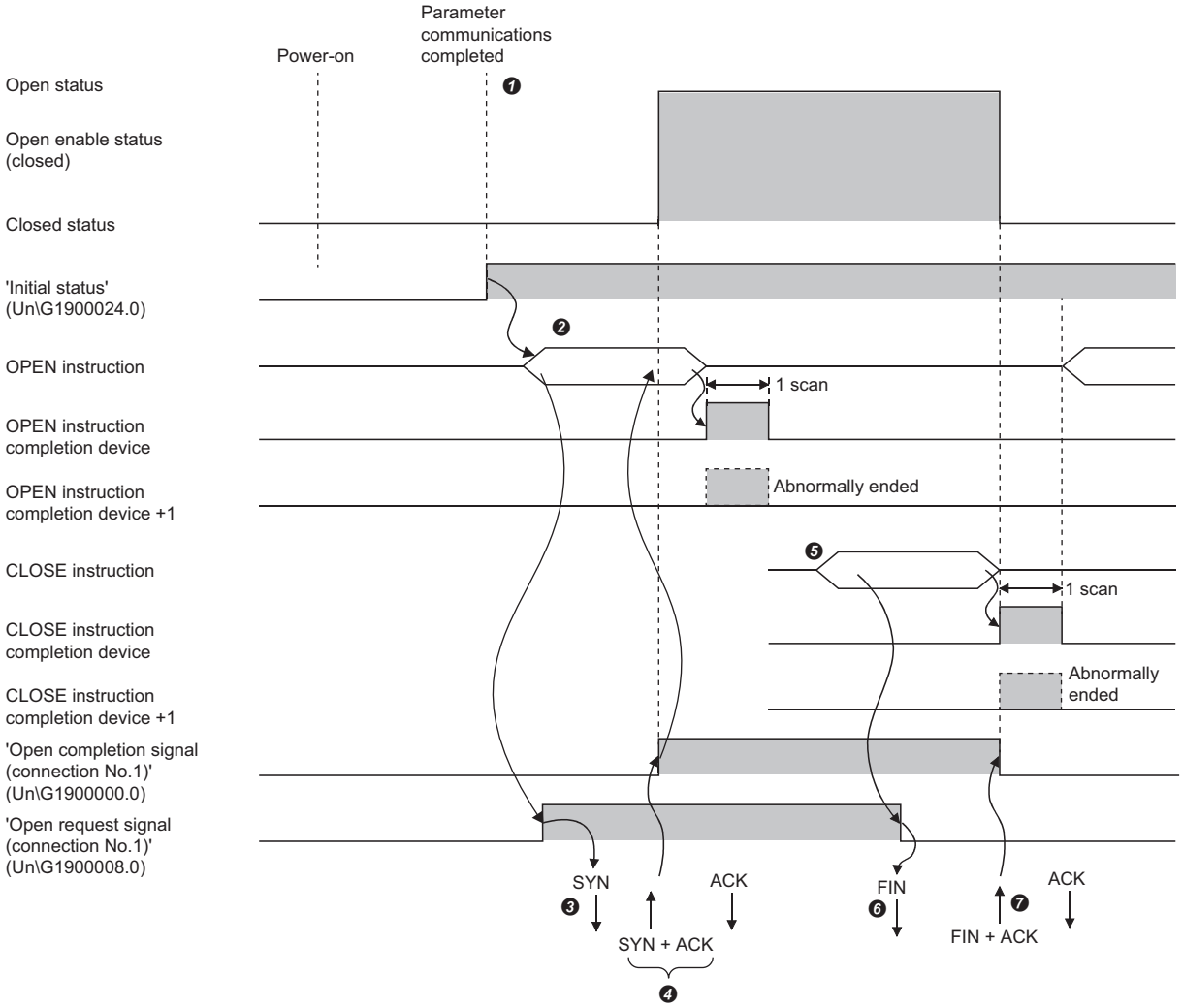
Active open is a connection method that performs an active open processing in respect to an external device (Passive open) that is in a passive open standby state for a connection. The following figure shows the process for the Ethernet-equipped module to Active open.

For OPEN/CLOSE instruction, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

Ex.

Open/close processing for connection No.1



❶ After the module parameters are set, checks that the initial processing for the Ethernet-equipped module has completed normally. ('Initial status' (Un\G1900024.0): On)

❷ Start the open processing using the OPEN instruction. ('Open request signal (connection No.1)' (Un\G1900008.0): On)

❸ The Ethernet-equipped module executes the open processing. (The module sends open request (SYN) to the external device.)

❹ Data can be exchanged after the open processing completes normally.*1

❺ Start the close processing using the CLOSE instruction. ('Open request signal (connection No.1)' (Un\G1900008.0): Off)

❻ The Ethernet-equipped module executes the close processing. (The module sends close request (FIN) to external device.)

❼ Data communication ends when close processing completes normally.*2

*1 If RST is returned from the external device after SYN is sent from the Ethernet-equipped module, open abnormal completion occurs immediately, and the open processing ends.

*2 If ACK or FIN is not returned even after the TCP end timer time, the Ethernet-equipped module forcibly cuts off the connection (sends RST). (Close abnormal completion)

Passive open procedure

The following two types of connection methods can be used to Passive open the Ethernet-equipped module.

Connection method	Description
Unpassive	This connection method executes a passive open processing for the connection to all devices connected to the network without restriction to the IP address or port number of the communication destination.
Fullpassive	When the IP address and port number of the communication destination are specified, this connection method executes a passive open processing for the connection of the specific external device.

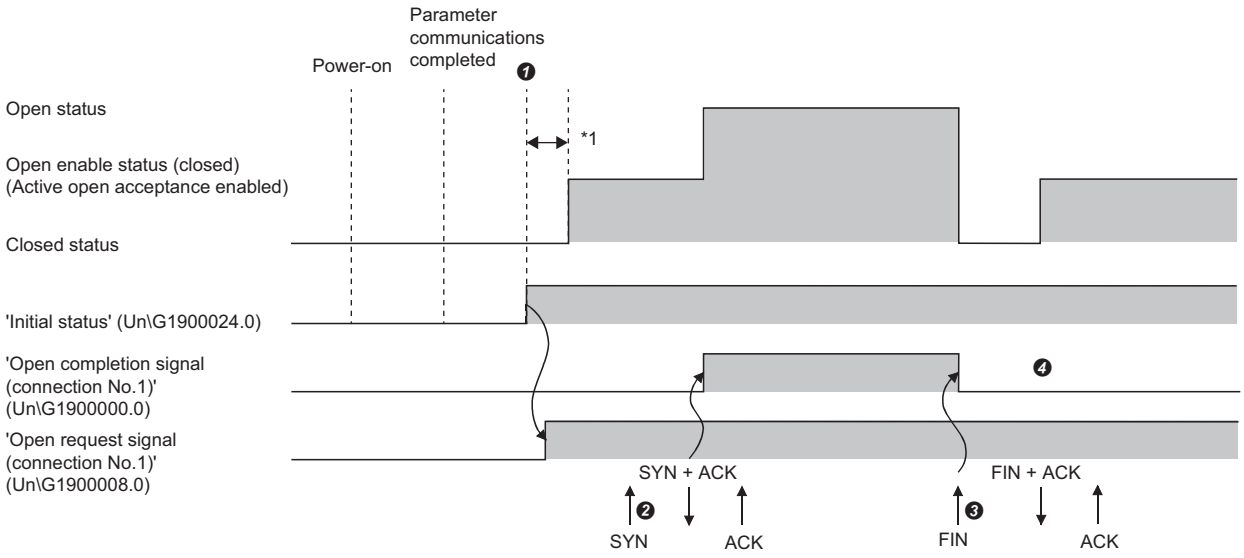
The open/close processing procedure for Passive open follows the setting of "Opening Method" under "Own Node Settings" in "Basic Settings". (☞ Page 125 Own Node Settings)

■When "Do Not Open by Program" is set

The Ethernet-equipped module is constantly in the open standby state, so the connection is established when Active open is initiated by the external device. This eliminates the need for an open/close processing program on the Ethernet-equipped module side.

Ex.

Open/close processing for connection No.1



❶ After the module parameters are set, checks that the initial processing for the Ethernet-equipped module has completed normally. ('Initial status' (Un\G1900024.0): On) When the initial processing completes normally, the connection enters the open enable state, and the module waits for the open request from the external device.

❷ The Ethernet-equipped module executes the open processing when an open request (SYN) is received from the external device. When the open processing ends normally, 'Open completion signal (connection No.1)' (Un\G1900000.0) turns on and data communication is enabled.

❸ The Ethernet-equipped module executes the close processing when the close request (FIN) is received from the external device. When the close processing completes normally, the open completion signal turns off and data communication is disabled.

❹ After the internal processing in the Ethernet-equipped module completes, the connection stands by for the open request again.

*1 The open request (SYN) received between the initial processing normal completion to the open request standby state is handled as an error, and the Ethernet-equipped module sends a connection forced close (RST) (to the external device that sent the open request (SYN)).

Point

When the open/close processing is executed with a dedicated instruction from the Ethernet-equipped module, even if "Do Not Open by Program" is set in "Opening Method" under "Own Node Settings" in "Basic Settings", the connection will not return to the open request standby state after the close processing completes.

■When "Open by Program" is set

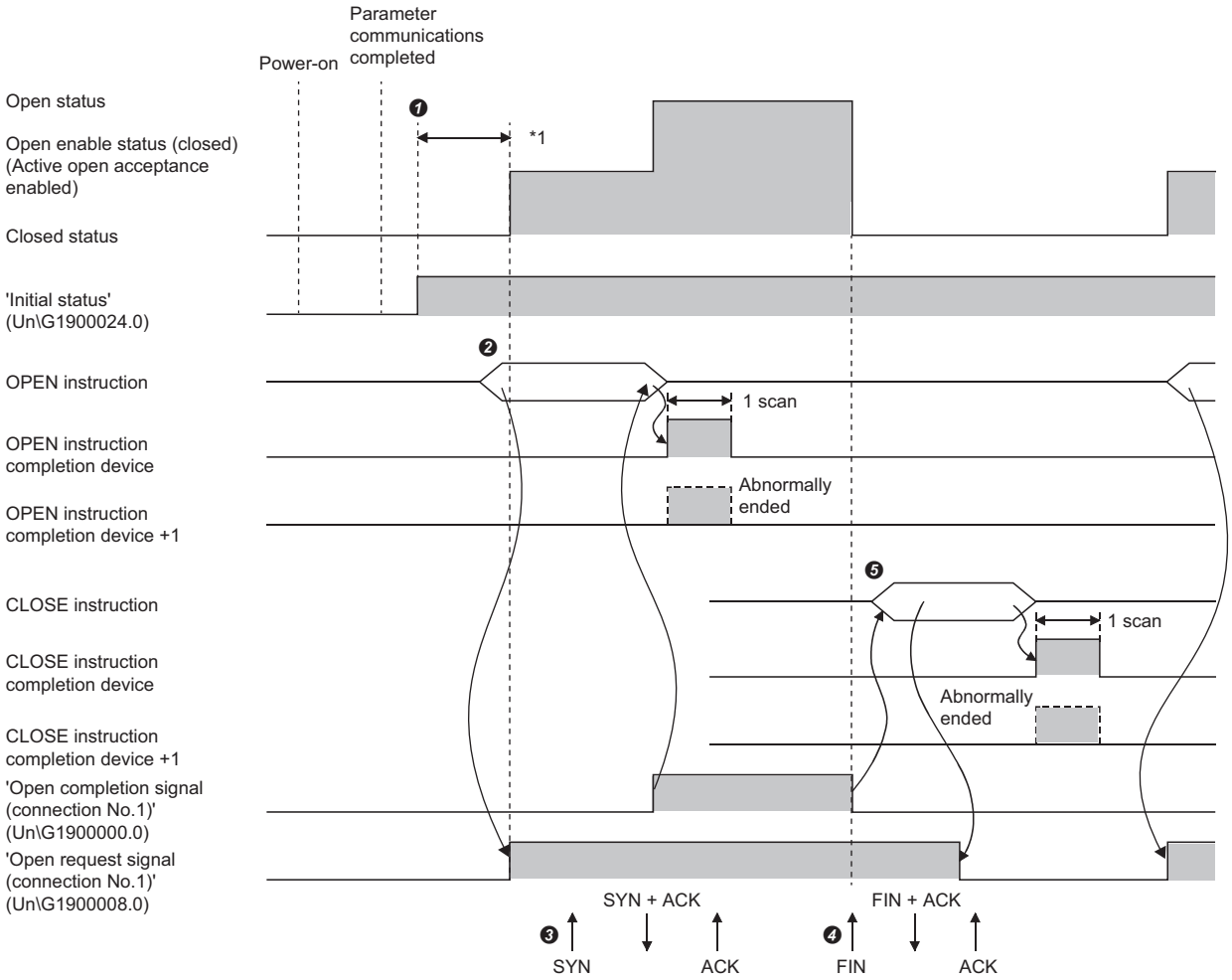
Before the open/close request is received from the external device, the Ethernet-equipped module must execute the OPEN/CLOSE instruction and enter the open/close standby state. Data can be sent and received after the open processing completes normally.

For OPEN/CLOSE instruction, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

Ex.

Open/close processing for connection No.1



❶ After the module parameters are set, checks that the initial processing for the Ethernet-equipped module has completed normally. ('Initial status' (Un\G1900024.0): On)

❷ Start the open processing using the OPEN instruction. ('Open request signal (connection No.1)' (Un\G1900008.0): On)

❸ The Ethernet-equipped module executes the open processing when an open request (SYN) is received from the external device. When the open processing ends normally, 'Open completion signal (connection No.1)' (Un\G1900000.0) turns on and data communication is enabled.

❹ The Ethernet-equipped module executes the close processing when the close request (FIN) is received from the external device. When the close processing completes normally, the open completion signal turns off and data communication is disabled.

*1 The open request (SYN) received between the initial processing normal completion to the open request standby state is handled as an error, and the Ethernet-equipped module sends a connection forced close (RST) (to the external device that sent the open request (SYN)).

Point

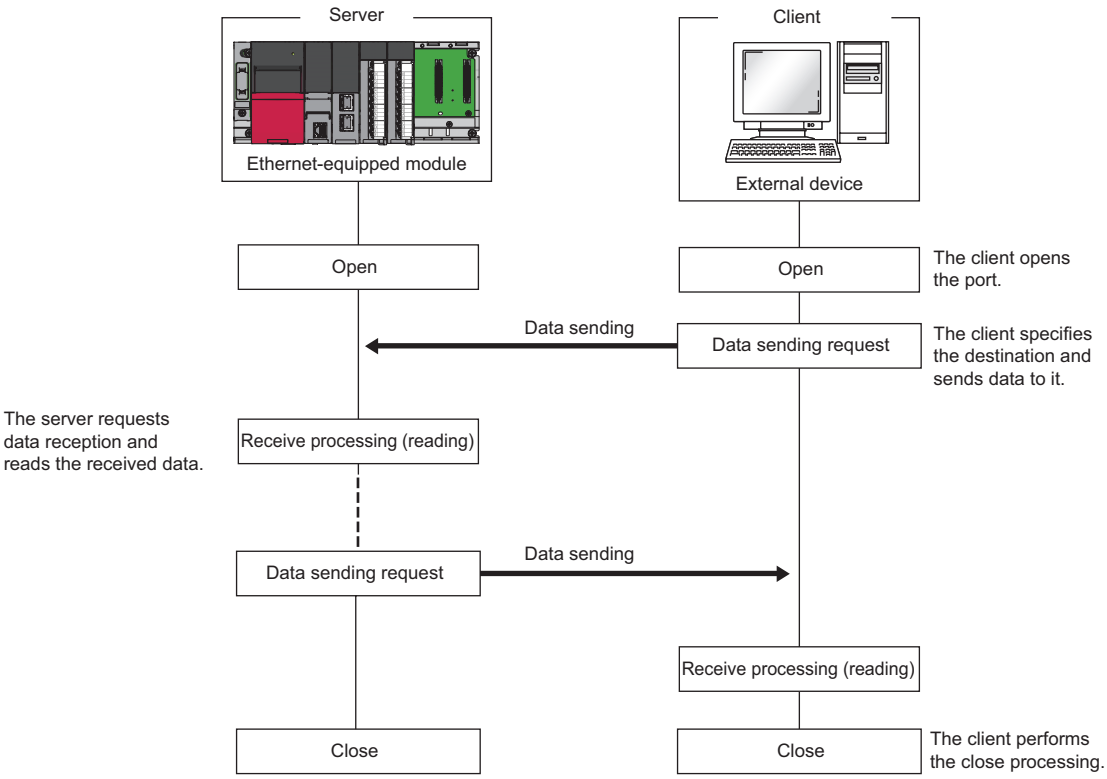
- Change the connection setting before executing the OPEN instruction.
- After the open processing is executed, the open request cannot be canceled until the open processing completes. Execute the close processing (CLOSE instruction) after open completes.

UDP/IP communications

This section describes the UDP/IP communications. Since UDP/IP communications does not establish a connection during communication and does not check that the communication destination has correctly received the data, the line load is lower. Note that the data reliability is lower than TCP/IP communications.

Communication flow

UDP/IP communications does not require a process to establish a connection with the external device as is required with TCP/IP communications.



Point

Wait at least 500ms or more before executing the open processing again after the close request is sent from the external device to the Ethernet-equipped module.

Open procedure

The open/close processing procedure is as follows, according to the setting of "Opening Method" under "Own Node Settings" in "Basic Settings". (☞ Page 125 Own Node Settings)

■When "Do Not Open by Program" is set

After the Ethernet-equipped module mounted station starts up, the UDP/IP communications setting connection automatically opens, and data send/receive is enabled. Program for open/close processing is not required.

Point

When the open/close processing is executed with a dedicated instruction from the Ethernet-equipped module, even if "Do Not Open by Program" is set in "Opening Method" under "Own Node Settings" in "Basic Settings", the open/close processing after a connection with the external device is established must be executed by the program.

■When "Open by Program" is set

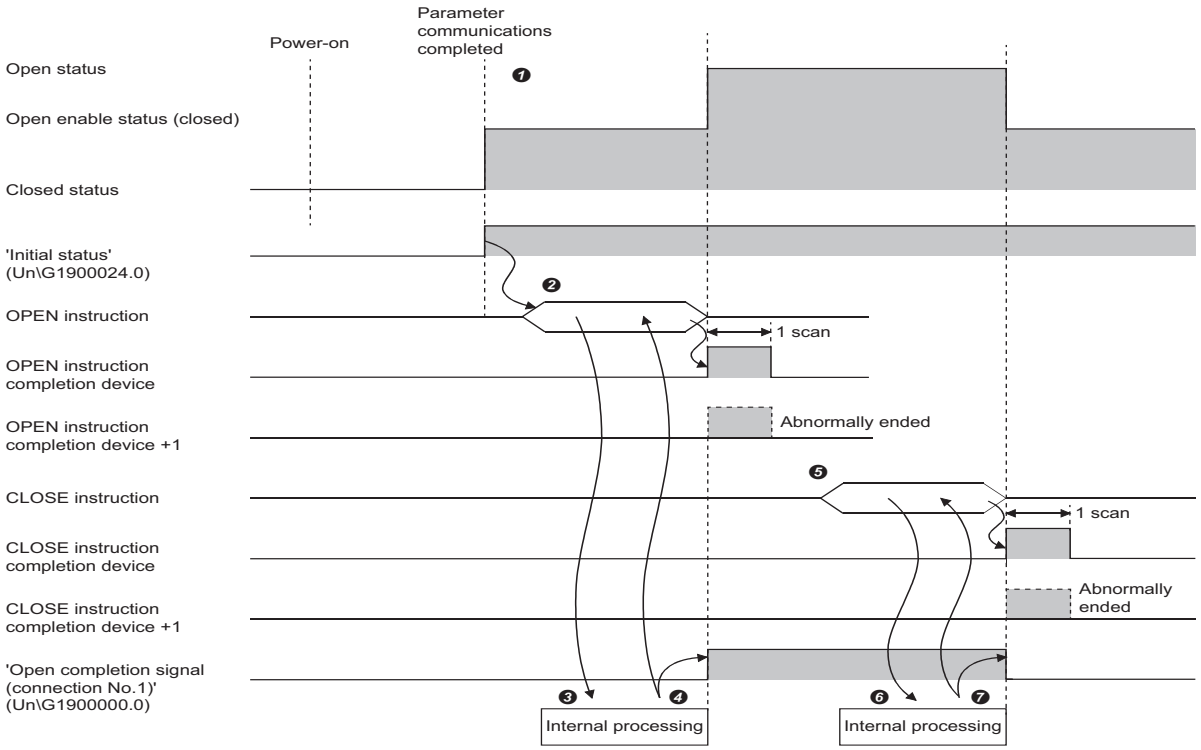
Before the open/close request is received from the external device, the Ethernet-equipped module must execute the OPEN/CLOSE instruction and enter the open/close standby state. Data can be sent and received after the open processing completes normally.

For OPEN/CLOSE instruction, refer to the following.

MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

Ex.

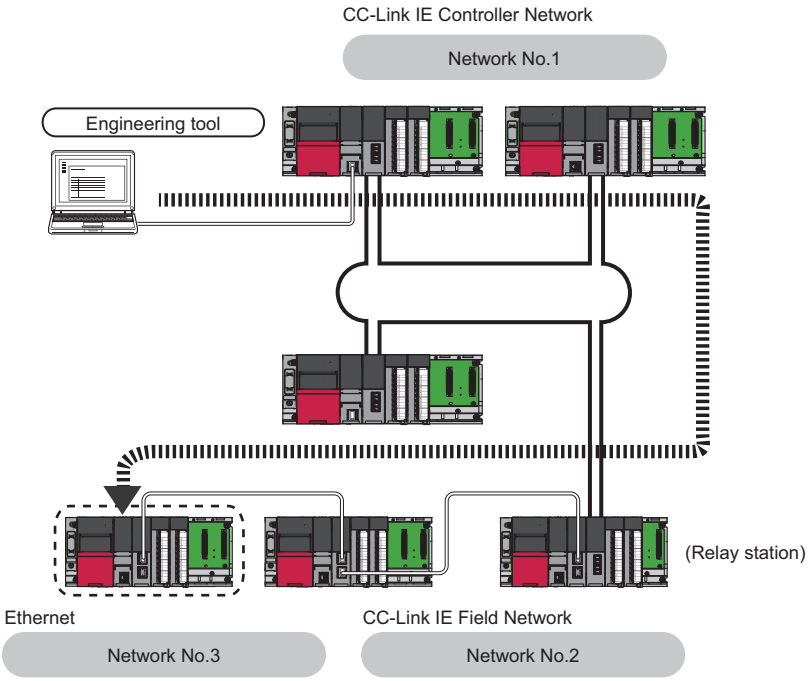
Open/close processing for connection No.1



❶ After the module parameters are set, checks that the initial processing for the Ethernet-equipped module has completed normally. ('Initial status' (Un\G1900024.0): On)
❷ Start the open processing using the OPEN instruction. ('Open request signal (connection No.1)' (Un\G1900008.0): On)
❸ The Ethernet-equipped module executes the open processing. (only internal processing)
❹ Data can be exchanged after the open processing completes normally.
❺ Start the close processing using the CLOSE instruction. ('Open request signal (connection No.1)' (Un\G1900008.0): Off)
❻ The Ethernet-equipped module executes the close processing. (only internal processing)
❼ Data communication ends when close processing completes normally.

Appendix 6 Communications with Different Networks

Different network stations can be accessed with dedicated instructions or the engineering tool, allowing seamless communication.



The following functions are used to communicate with different networks.

Functions capable of communication	Communication request source	Reference source
Communications using SLMP	External device	☞ Page 23 SLMP Communications 🕮 SLMP Reference Manual
Communications using the link dedicated instruction	CPU module on another station	☞ Page 97 Link Dedicated Instruction Communication
Communications with other stations using the engineering tool	Engineering tool	🕮 GX Works3 Operating Manual

Point

- UDP/IP communications is used to communicate with other networks. Data is always exchanged as binary codes.
- Communications can be made with stations up to eight networks apart (number of relay stations: 7).

When the networks consist of only MELSEC iQ-R series

Communication paths are automatically set for communication with the following networks of MELSEC iQ-R series.

- Ethernet
- CC-Link IE Controller Network
- CC-Link IE Field Network

■Setting procedure

Use the following procedure.

1. Set the network number, station number, and transient transmission group number in the "Own Node Settings" under "Basic Settings". (☞ Page 126 Communications by Network No./Station No.)
2. Set the "Network Dynamic Routing" under "Application Settings" to "Enable".

Point

- Communication paths are automatically set, but they can also be manually set. To set communication paths manually, refer to the following. (☞ Page 227 When the networks consist of MELSEC iQ-R series and other series)
- The communication path cannot be set automatically for Ethernet-equipped modules connected via a router. Set the communication path manually. (☞ Page 227 When the networks consist of MELSEC iQ-R series and other series)

When the networks consist of MELSEC iQ-R series and other series

Setting communication paths allows communication with the following networks configured with modules other than MELSEC iQ-R series.

- Ethernet
- CC-Link IE Controller Network
- CC-Link IE Field Network
- MELSECNET/H
- MELSECNET/10

■Setting procedure

Use the following procedure.

1. Set the network number, station number, and transient transmission group number in the "Own Node Settings" under "Basic Settings". (☞ Page 126 Communications by Network No./Station No.)
2. Set the send destination station information in "Network/Station No. <-> IP information setting" under "Applied Settings". (☞ Page 141 Network/Station No. <-> IP information setting)
3. Set communication paths in "Routing Setting" of the CPU parameters.

(📖 MELSEC iQ-R CPU Module User's Manual (Application))

Appendix 7 Processing Time

Calculate the minimum processing time for each function with the following formula. Note that the processing time may be even longer due to the network load rate (line congestion), each connected device's window size, number of connections being used simultaneously, and the system configuration. The value calculated with the following formula is a guide for the processing time when communicating with only one connection.

Minimum processing time of fixed buffer communications (between the RJ71EN71s)

■Procedure exists

Tfs = St + Ke + (Kdf × Df) + Sr

- Tfs: Time from start to end of send (unit: ms)
- St: Sending station scan time
- Ke, Kdf: Constant (refer to following table)
- Df: Number of send data words
- Sr: Receiving station scan time

Item	RJ71EN71			
	During TCP/IP communications		During UDP/IP communications	
	Ke	Kdf	Ke	Kdf
When communicating with binary code data	6	0.0030	3	0.0020
When communicating with ASCII code data	6	0.0100	4	0.0015

■No procedure

Tfs = St + Ke + (Kdf × Df)

- Tfs: Time from start to end of send (unit: ms)
- St: Sending station scan time
- Ke, Kdf: Constant (refer to following table)
- Df: Number of send data bytes

Item	RJ71EN71			
	During TCP/IP communications		During UDP/IP communications	
	Ke	Kdf	Ke	Kdf
When communicating with binary code data	4	0.0010	3	0.0007

Minimum processing time of communications using the random access buffer

Trs = Kr + (Kdr × Df) + external device ACK processing time (added only during TCP/IP communications)

- Trs: Time from reception of personal computer request data to complete of process by RJ71EN71 (unit: ms)
- Kr, Kdr: Constant (refer to following table)
- Df: Number of request data words
- External device ACK process time: Time until external device returns ACK upon completion of random access buffer read/write

Item		RJ71EN71			
		During TCP/IP communications		During UDP/IP communications	
		Ke	Kdf	Ke	Kdf
During read	When communicating with binary code data	2.5	0.0020	1.8	0.0025
	When communicating with ASCII code data	2.5	0.0060	1.9	0.0065
During write	When communicating with binary code data	2.5	0.0025	1.8	0.0025
	When communicating with ASCII code data	2.6	0.0070	1.9	0.0060

Appendix 8 Port Numbers Used by Ethernet-equipped Module

The following port numbers are used by the system and cannot be specified.

Port Number		Applications	
Decimal	Hexadecimal	CPU module	RJ71EN71
5000	1388H	For system	Auto-open UDP port (default value)
5001	1389H	For system	MELSOFT application communication port (UDP/IP)
5002	138AH	For system	MELSOFT application communication port (TCP/IP)
5003	138BH	For system	MELSOFT application direct connection port
5004	138CH	For system	For system
5005	138DH	Auto-open UDP port (default value)	For system
5006	138EH	MELSOFT application communication port (UDP/IP)	For system
5007	138FH	MELSOFT application communication port (TCP/IP)	For system
5008	1390H	MELSOFT application direct connection port	For system
5009	1391H	For system	For system

Appendix 9 Operation Image and Data Structure of Predefined Protocol

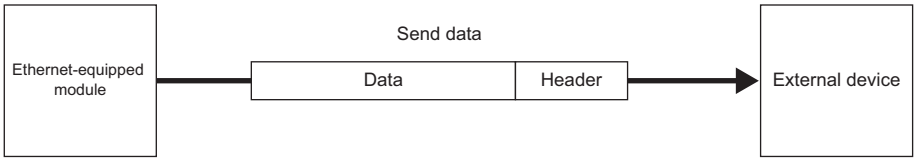
Operation image of each communication type of protocol

With the predefined protocol support function, data is communicated with the external device using the "Send Only", "Receive Only", and "Send & Receive" communication types.

This section describes the operation images of each communication type.

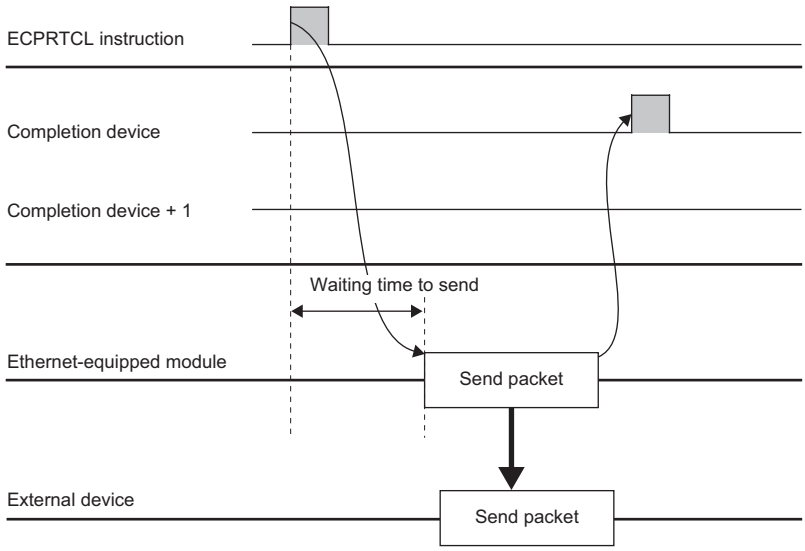
For "Send Only" communication type

The specified packet is sent once.

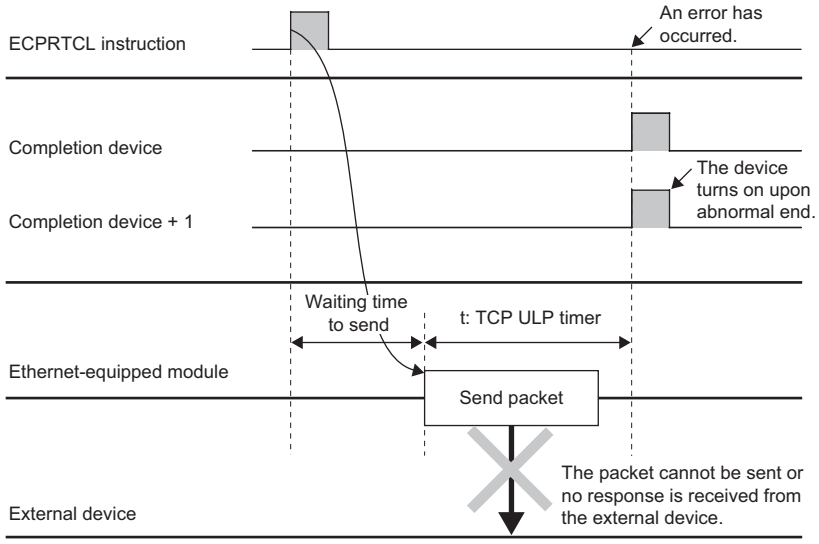


The operation image of "Send Only" is shown below.

■When the instruction completed successfully



■When the instruction completed with an error at TCP/IP (timeout error)


ECPRTCL instruction
An error has occurred.
Completion device
The device turns on upon abnormal end.
Completion device + 1
Waiting time to send
t: TCP ULP timer
Ethernet-equipped module
Send packet
The packet cannot be sent or no response is received from the external device.
External device

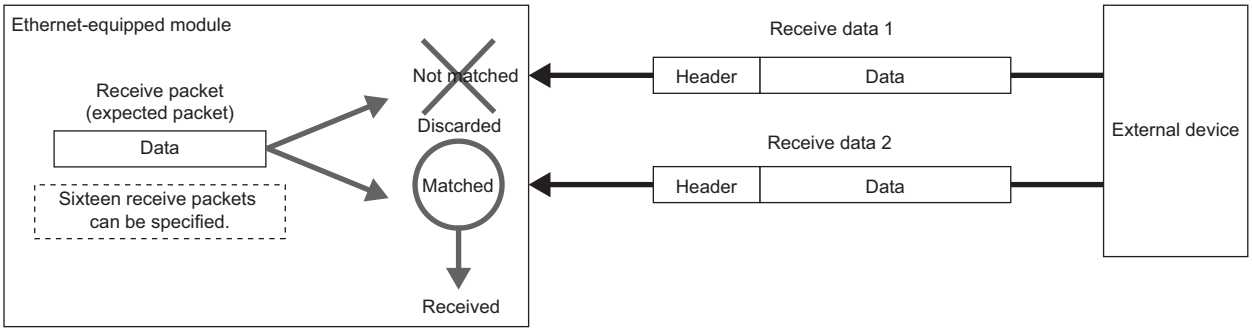
Point

For details on errors that occur when the communication completed abnormally, refer to the error code stored in the buffer memory.

(☞ Page 169 List of Error Codes)

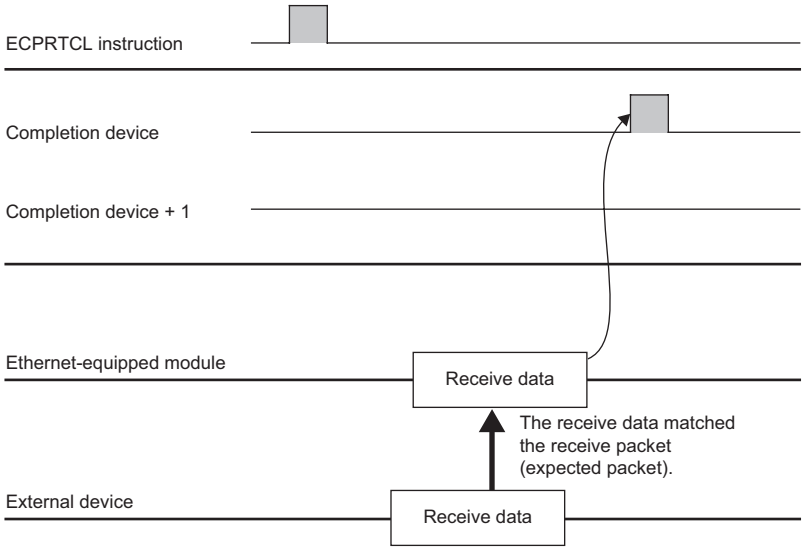
For "Receive Only" communication type

When data is received from the external device, it is verified with the receive packet (expected packet). If it matches, the receive processing ends. If the verification does not match, the received data is discarded.

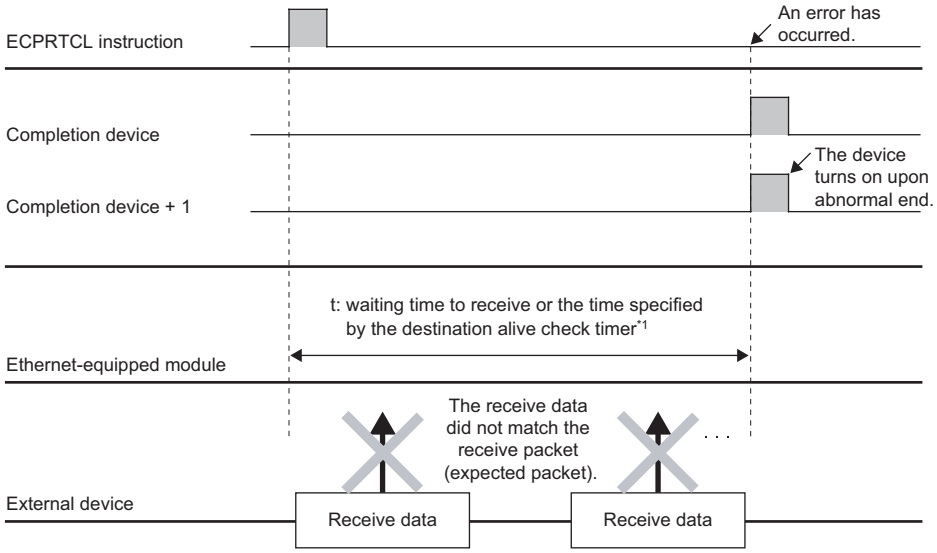


The operation image of "Receive Only" is shown below.

■When the instruction completed successfully



■When the instruction completed with an error (timeout error)


ECPRTCL instruction
An error has occurred.
Completion device
Completion device + 1
The device turns on upon abnormal end.
t: waiting time to receive or the time specified by the destination alive check timer*1
Ethernet-equipped module
The receive data did not match the receive packet (expected packet).
External device
Receive data
Receive data

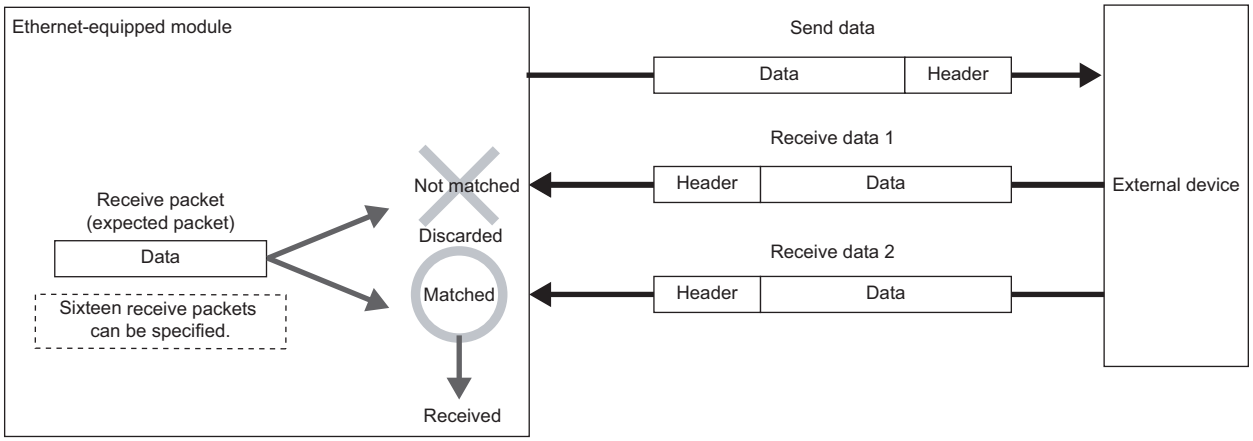
*1 When the receive packet (expected packet) verification does not match before the reception wait time, or when other device existence cannot be checked within the destination alive check time (time calculated from destination alive check start interval timer value, destination alive check interval timer value, and destination alive check resend count).

Point

- When variables are included in receive packet (expected packet) elements, variable data are not verified.
- Up to 16 receive packets (expected packets) can be specified.
- When multiple packets are specified, the received data is verified with the registered receive packet (expected packet) in the order of registration. The receive processing is completed when a matching receive packet (expected packet) is found, and the subsequent verification is canceled.
- The number of the matching received packet is stored in the control data of the ECPRTCL instruction and the buffer memory.
- For details on errors that occur when the communication completed abnormally, refer to the error code stored in the buffer memory. (☞ Page 169 List of Error Codes)

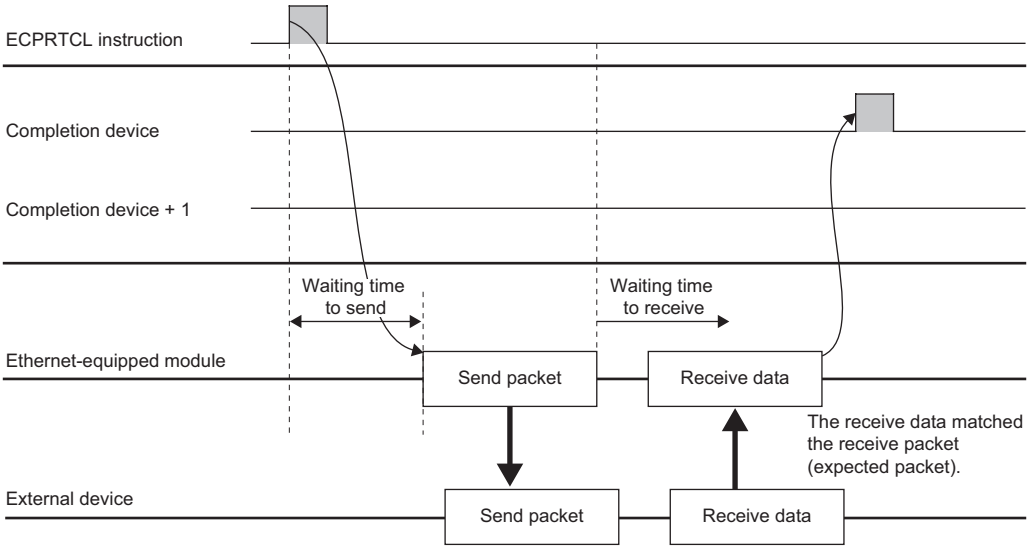
For "Send & Receive" communication type

The packet is sent once. If the send completed successfully, the module shifts to the receiving standby state. When data is received from the external device, it is verified with the receive packet (expected packet). If it matches, the receive processing ends.

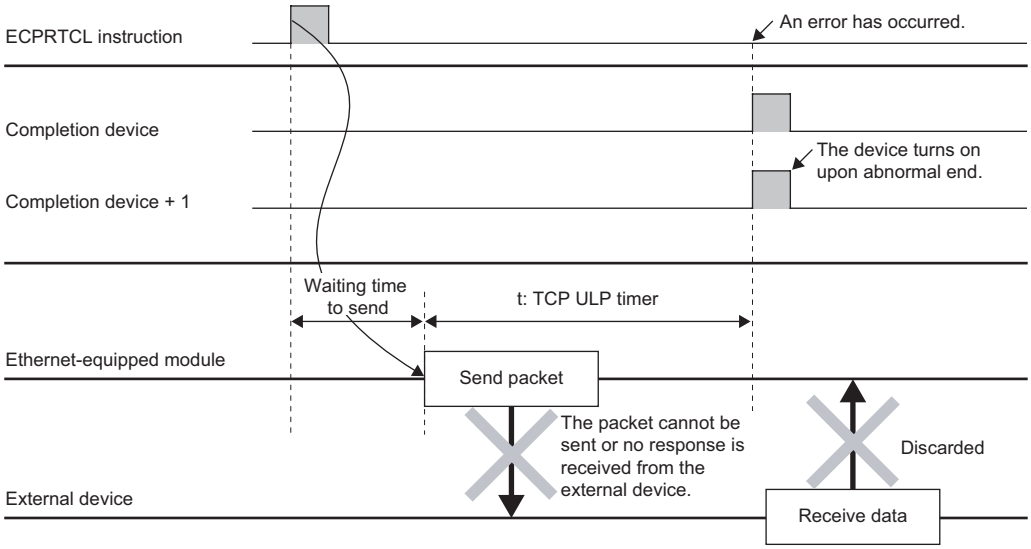


The operation image of "Send & Receive" is shown below.

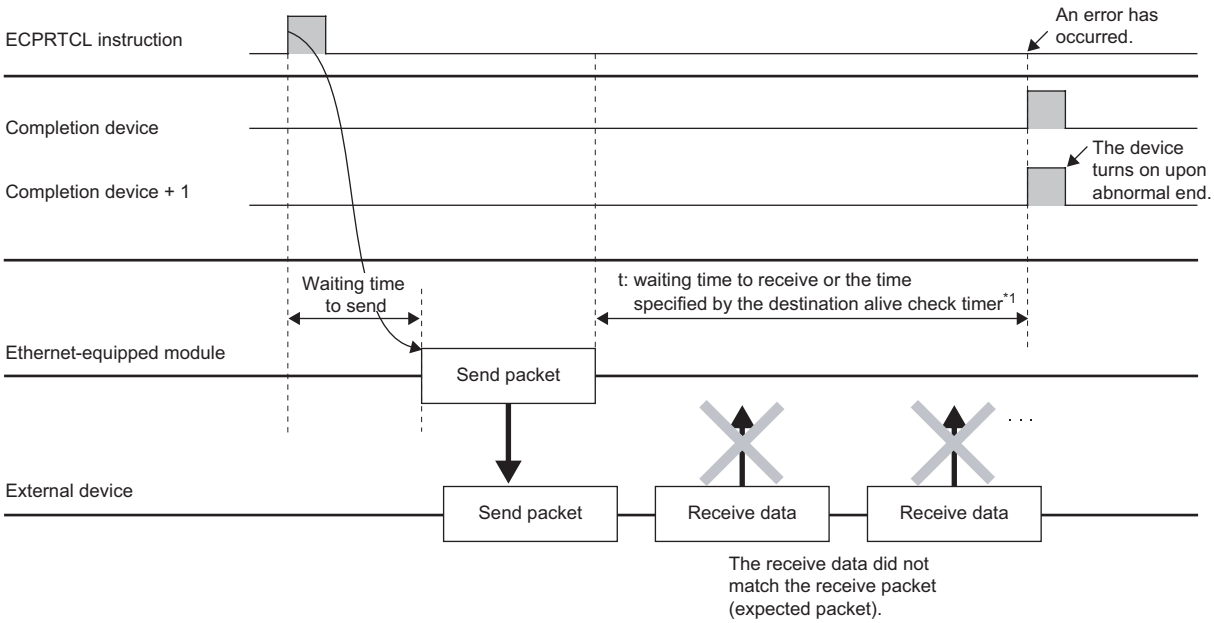
■When the instruction completed successfully



■When the instruction completed with an error (timeout error at sending)



■When the instruction completed with an error (timeout error of waiting time to receive)


ECPRTCL instruction
An error has occurred.
Completion device
The device turns on upon abnormal end.
Completion device + 1
Waiting time to send
t: waiting time to receive or the time specified by the destination alive check timer*1
Ethernet-equipped module
Send packet
External device
Send packet
Receive data
Receive data
The receive data did not match the receive packet (expected packet).

*1 When the receive packet (expected packet) verification does not match before the reception wait time, or when other device existence cannot be checked within the destination alive check time (time calculated from destination alive check start interval timer value, destination alive check interval timer value, and destination alive check resend count).

Point

For details on errors that occur when the communication completed abnormally, refer to the error code stored in the buffer memory.

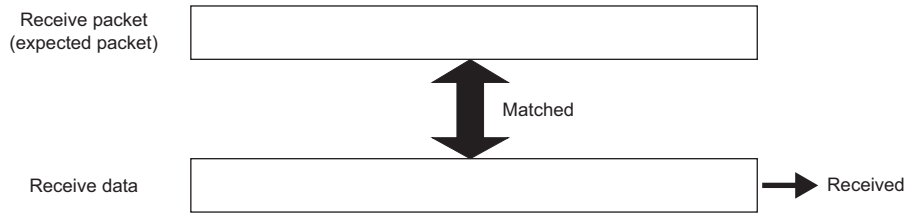
(☞ Page 169 List of Error Codes)

Verification operation of receive packet

This section describes the receive packet (expected packet) verification operation for communication with an external device when the protocol communication type contains reception.

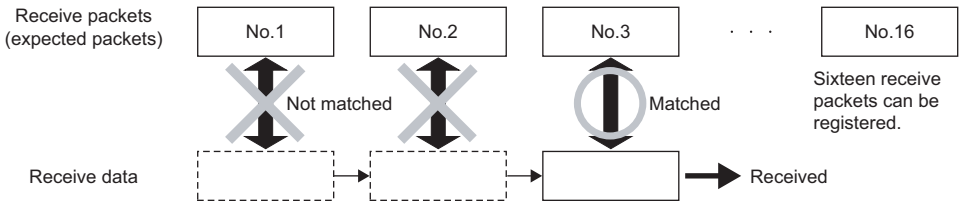
When received data are matched with a receive packet (expected packet)

The received data is compared against the receive packet (expected packet), and the receive processing completes when the verification matches.



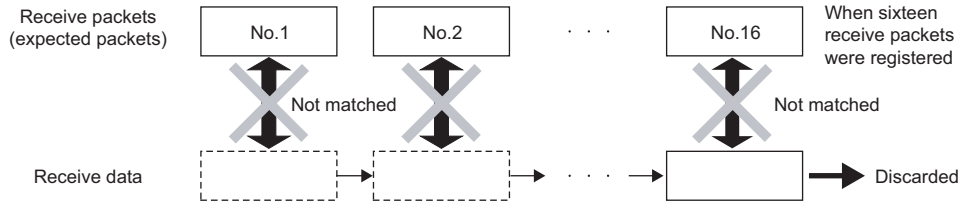
When multiple receive packets (expected packets) are specified

Up to sixteen receive packets (expected packets) can be registered with the predefined protocol support function. When the data are received, the registered receive packet (expected packet) is verified in the order of registration. The receive processing completes as soon as a matching receive packet (expected packet) is found.



When received data does not match with all receive packet (expected packet)

If the received data does not match any of the registered receive packets (expected packets), the received data is discarded.



Example of packet element data

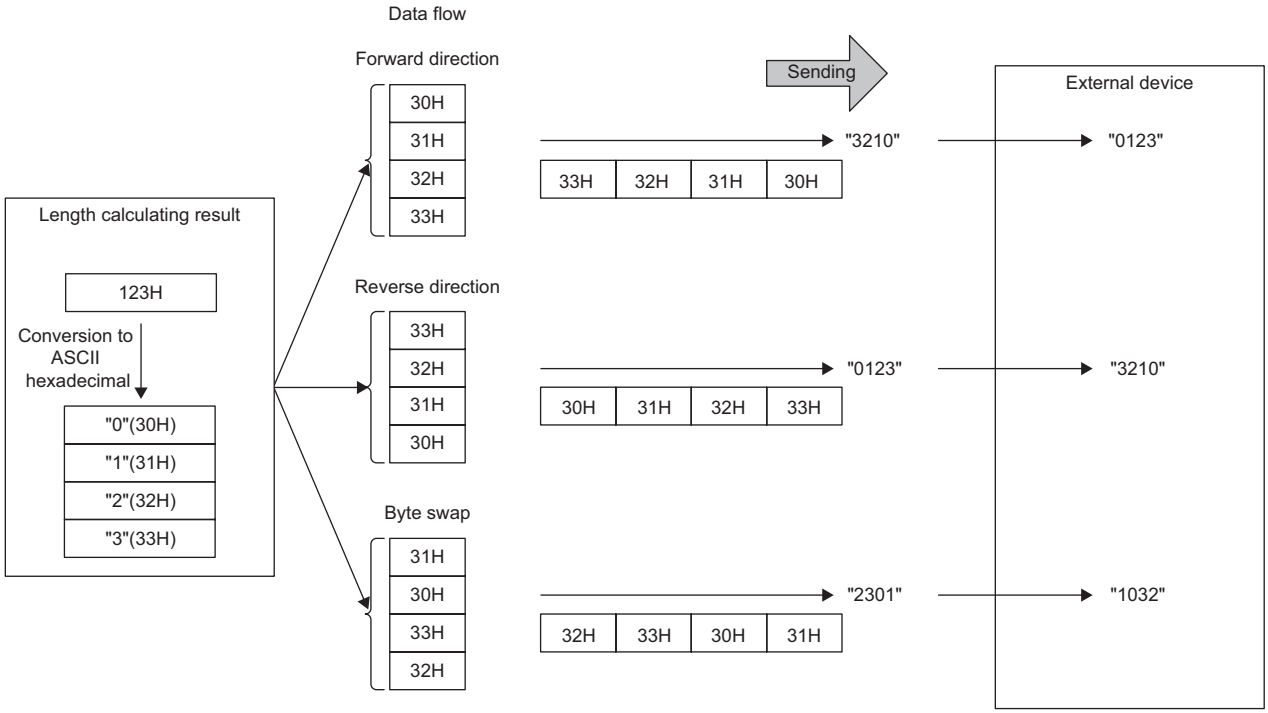
The element processing procedures that can be set for the packets, the actual data examples, and others are shown below.

Length

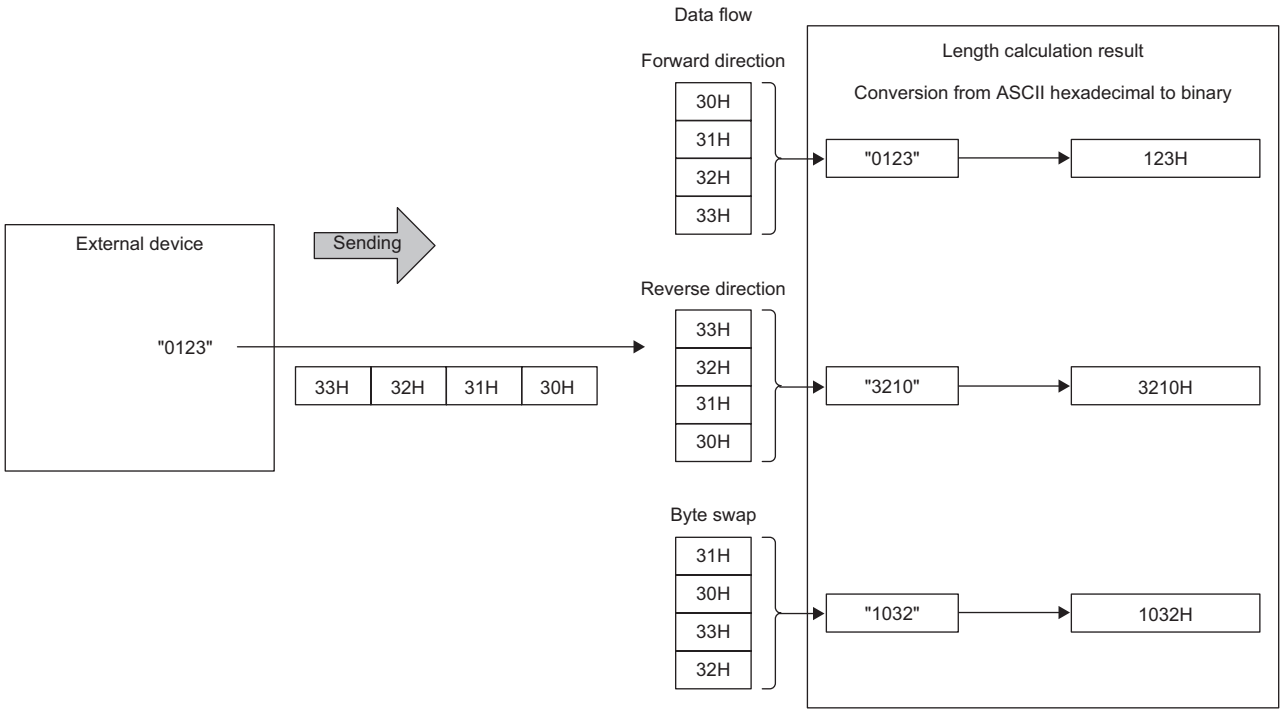
■Process procedure

The Ethernet-equipped module processes the length with the following procedure.

[During send]



[During receive]



■Data flow

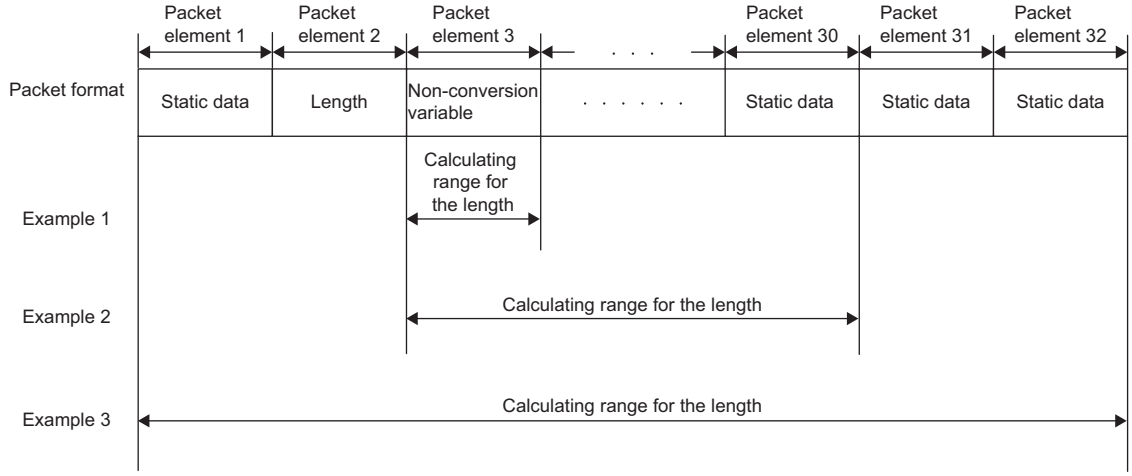
Data flow is used to specify the order of send data and receive data.

The data flow can be specified in forward direction (upper byte → lower byte), reverse direction (lower byte → upper byte), and byte swap (by word).

- Forward direction, reverse direction: Available when the data length is 2 bytes or more.
- Byte swap: Available only when the data length is 4 bytes.

■Calculating range

Examples of specifying the length calculating range are shown below.



Example 1:Calculating range when start of range is set as 3 and end is set as 3
Example 2:Calculating range when start of range is set as 3 and end is set as 30
Example 3:Calculating range when start of range is set as 1 and end is set as 32

Non-conversion Variable

■Process procedure

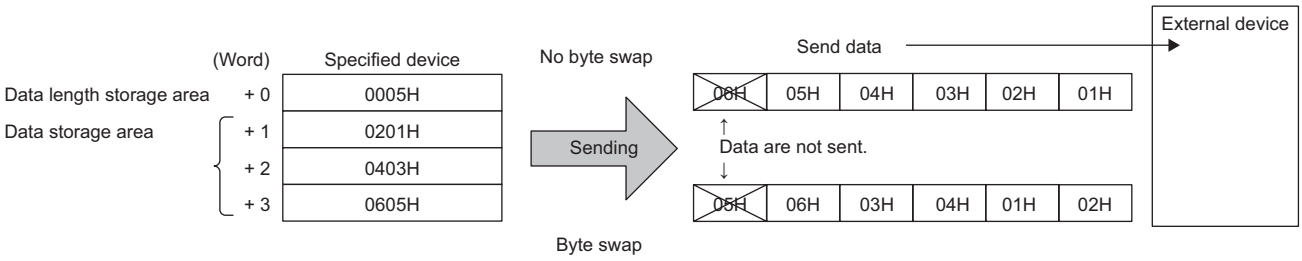
The Ethernet-equipped module processes the non-conversion variable element with the following procedure.

When unit of stored data is "Lower Byte + Upper Byte"

- When the data length of a send packet is an odd number, the upper byte (lower byte for "Byte Swap") of the end device is not sent.
- When the data length of a receive packet is an odd number, the last data is stored with one byte of 00H.

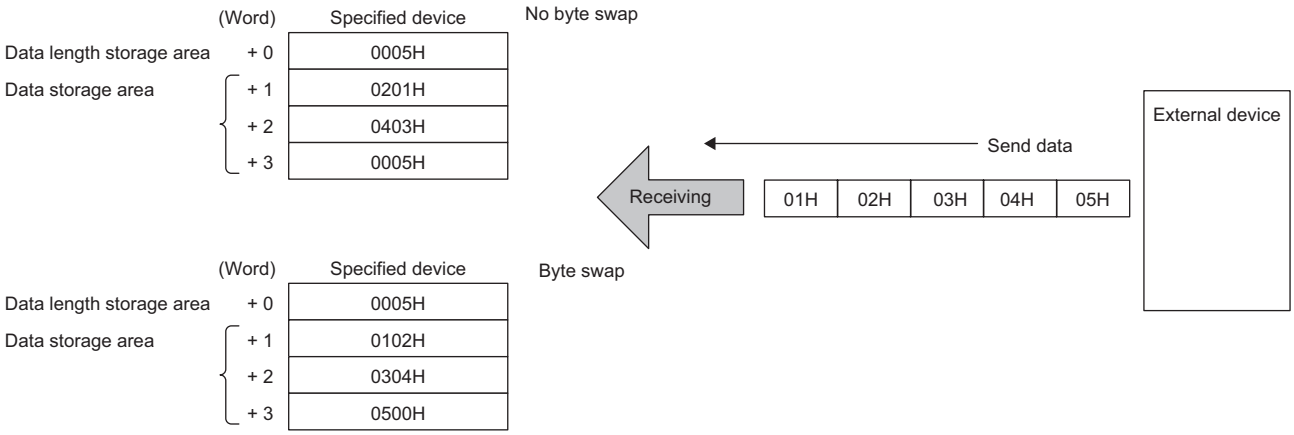
Ex.

When sending data whose length is an odd number



Ex.

When receiving data whose length is an odd number



When unit of stored data is "Lower Byte Only"

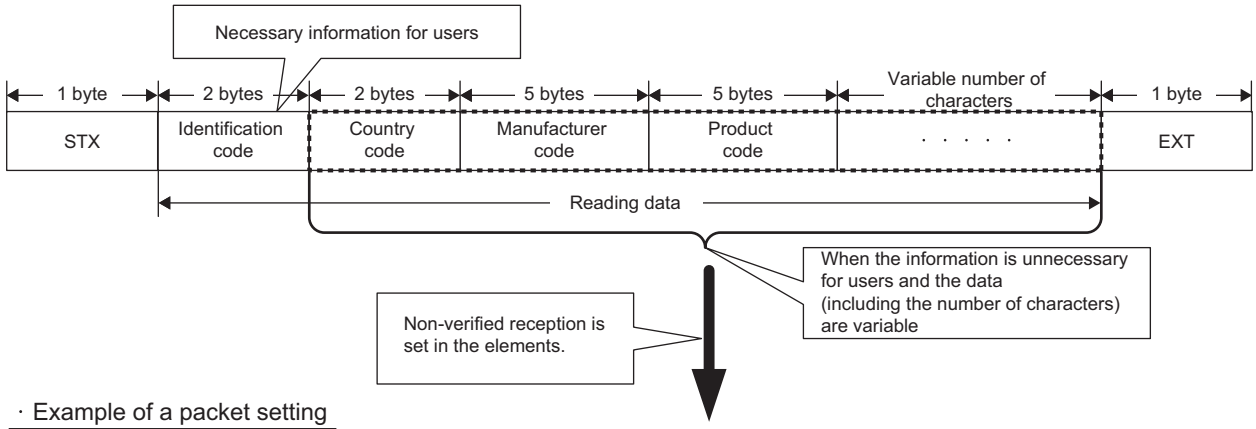
- A size double the data length is occupied. For the upper data, the Ethernet-equipped module ignores the data at sending and adds 00H to the data at receiving.

Non-verified reception

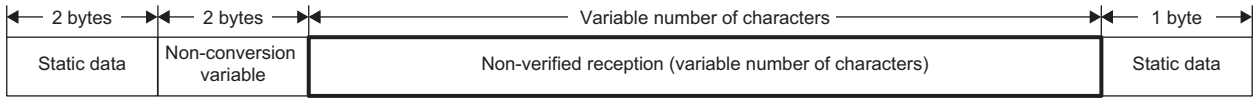
The usage examples for a non-verified reception element is shown below.

Ex.

· Example of a packet format of the external device



· Example of a packet setting



In the above type of packet format, the following operation can be executed by setting reception without verification.

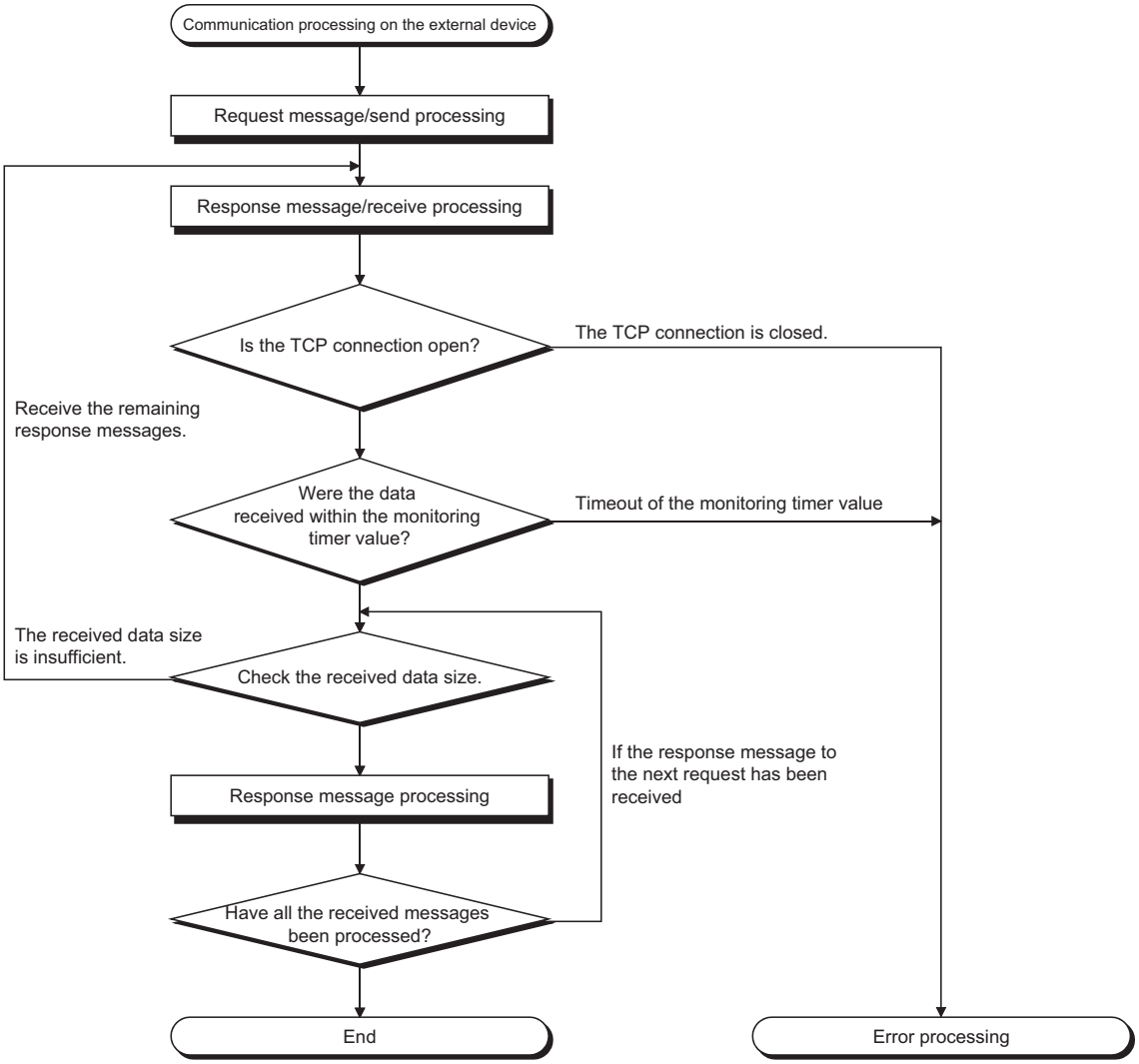
- It is possible to store only the required information in the CPU module's device or buffer memory.
- Even if the received packet contains data that changes with each communication, it can be handled with one protocol (packet).

Appendix 10 Example of External Device Program

An example of the program in the external device connected to the same Ethernet as the Ethernet-equipped module is shown below. Each program is the minimum required program for the communication test. Change the IP address or port number according to the system. When including process for errors, add it separately.

External device receiving process

An example of the external device receiving process is shown below.


Communication processing on the external device
Request message/send processing
Response message/receive processing
Is the TCP connection open?
The TCP connection is closed.
Receive the remaining response messages.
Were the data received within the monitoring timer value?
Timeout of the monitoring timer value
The received data size is insufficient.
Check the received data size.
If the response message to the next request has been received
Response message processing
Have all the received messages been processed?
End
Error processing

Point

When communicating with Ethernet, the TCP socket functions (socket functions) are used in the personal computer. There is no concept of boundary with these functions. When the send side calls the send function once and sends data, the receiving side must call the recv function once, twice, or depending on the circumstance more times to read that data. (send and recv do not correspond one-on-one.) Thus, the external device's program process must execute the receiving process as shown above.

Appendix 11 Added and Enhanced Functions

The following table lists the added and enhanced functions in the Ethernet-equipped module.

RJ71EN71

Added and enhanced function	Firmware version
Turning off the LED with the ERRCLEAR instruction	"05" or later

MEMO

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REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
June 2014	SH(NA)-081257ENG-A	First edition
July 2014	SH(NA)-081257ENG-B	Error correction
November 2014	SH(NA)-081257ENG-C	■Added or modified parts Section 2.2, 3.1, 3.2, 3.5, 3.7, Appendix 1, 2
April 2015	SH(NA)-081257ENG-D	■Added models R08PCPU, R16PCPU, R32PCPU, R120PCPU ■Added or modified parts Section 1.3, 1.5, 2.3, 3.5, Appendix 2, 4, 11

Japanese manual number: SH-081253-D

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WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

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(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

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SH(NA)-081257ENG-D(1504)MEE
MODEL: R-ETHER-U-OU-E
MODEL CODE: 13JX16

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